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# THE MEDICAL JOURNAL OF AUSTRALIA

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## SOME FALLACIES IN THE INTRADERMAL TEST FOR HYDATID DISEASE.[1]

By KEITH D. FAIRLEY, M.D., M.R.C.P.,

N. HAMILTON FAIRLEY, O.B.E., M.D., D.Sc., F.R.C.P., D.T.M. and H.,

AND

F. ELEANOR WILLIAMS,

*From the Walter and Eliza Hall Institute of Research, Melbourne.*

AN analysis by K. D. Fairley[(1)] of the intradermal reactions to filtered hydatid fluid in patients tested at the Walter and Eliza Hall Research Institute over the period 1921 to 1926 showed that a large proportion of patients yielding an immediate reaction before operation revealed no other evidence of hydatid disease. Only fifty-two of eighty-seven of such persons (59·8%) were proved to be harbouring echinococcal cysts. He concluded that while the absence of an immediate reaction to the intradermal test was a very valuable aid in excluding hydatid infestation, an immediate reaction could not be relied on as an indication of the presence of this parasite. It was therefore decided to make further investigations to account for this large proportion of apparently fallacious positive reactions.

Hydatid fluid is the antigen almost universally used for this test. In our experiments the mixed fluid from numerous uncomplicated cysts from the livers and lungs of sheep was used. It was collected with sterile precautions with the avoidance of contamination with sheep serum as far as possible and was filtered through a Seitz filter. After being tested by cultural methods for sterility it was stored in ampoules in the cold.

As the extensive literature on the use of the intradermal injection of hydatid fluid as a test for hydatid disease has been reviewed in the paper referred to above[(1)] it will not be further discussed.

### FALLACIES DUE TO THE ANTIGEN USED IN THE TEST.

#### Sensitization to the Proteins of Sheep Serum.

Graetz[(2)] first conclusively proved by anaphylactic experiments with guinea-pigs that hydatid fluid contained protein derived from the host. Van der Hoeden[(3)] confirmed these results by precipitin tests, showing the presence in hydatid fluids from horses and oxen of serum proteins of the respective hosts. Kellaway[(4)] experimenting with the isolated uterus of the guinea-pig, found that host serum protein could be demonstrated in most samples of hydatid fluid.

As the fluid used in the intradermal test is obtained almost universally from cysts of sheep, the existence in the community of individuals sensitive to sheep serum suggested the investigation of this potential source of error in the test—a possibility which Kellaway[(5)] had previously mentioned. It was decided to use a one in ten dilution of sheep serum in normal saline solution (0·9%) as a control injection in all cases. Sterility was insured by cultural methods after filtration through a Seitz filter. A number of patients who yielded apparently fallacious immediate reactions, was reinvestigated with the use of this additional control.

Only one case falling into this category was demonstrated.

The patient was suffering from polycystic disease of the kidneys. On July 3, 1926, no reactions were obtained with the complement fixation test for echinococcosis and with the delayed phase of the intradermal test, though an immediate reaction was reported. On May 26, 1927, reinvestigation revealed a doubtful immediate reaction (wheal 2·0 by 2·2 centimetres) with hydatid fluid from sheep cysts and a very intense reaction (wheal 3·5 by 3·5 centimetres) with sheep serum. No reaction followed the injection of hydatid fluid from cysts of oxen nor that of sheep hydatid fluid which had previously been boiled for an hour to remove host serum protein.

Obviously the reaction in this patient was due to the presence of sheep serum proteins in the fluid used for the original test.

Though sensitization to sheep serum is rare in the hospital population (one in 150 persons tested) it was decided after this experience to use a sheep serum control as a routine procedure in the test, for no positive findings can be correctly interpreted in patients injected with hydatid fluid derived from cysts of sheep without the knowledge afforded by this control.

#### Pharmacologically Active Substances in Hydatid Fluid.

Guisti and Hug[(6)] showed that 43·8% of hydatid fluids derived from cysts of sheep possessed pharmacological activity when tested on the isolated plain muscle of the guinea-pig. They found that active fluids in a concentration of one in 10,000 produced muscular contraction of the same magnitude as did histamine in one in 10,000,000. Bryce, Kellaway and Williams,[(7)] using a similar technique, investigated ten batches of hydatid fluid from sheep. Five proved to be inactive in a concentration of one in thirty, while the others showed a varying degree of activity in this concentration (that is, four cubic centimetres of hydatid fluid added to a 120 cubic centimetre bath in which the muscle was suspended). This action of active bacteria-free fluids resembled ergotoxin rather than histamine in that a second dose usually failed to cause a response. In two specimens in which there was no guarantee of sterility, a histamine-like action on the normal plain muscle was present. Fifty samples of hydatid fluid have since been investigated by Kellaway and twenty-six of them have shown activity mainly of the histamine type and demonstrable only in concentrations of one in fifty to one in ten. In this unpublished series only one or two examples of the ergotoxin-like type of reaction were observed, while no sample of hydatid fluid was found to give reactions in the concentrations described by Guisti and Hug. During the present investigation occasional samples of hydatid fluid were found to produce immediate or delayed reactions in patients who had never harboured hydatid cysts. For instance, nineteen such patients were tested one morning with a pharmacologically active fluid and the last seven showed typical delayed reactions with infiltration, heat, red-

[1] This work was carried out under a grant from the Commonwealth Government Department of Health.

ness, œdema and occasionally vesiculation. Unfortunately none of this fluid was available for cultural tests, but the reactions were mild and did not suggest the presence of any infective agent. Another sample gave rise to a number of pseudopositive wheals. These findings suggest the presence of some stimulant substance or the liberation of excessive amounts of "H" substance (Lewis[27]) on intradermal injection of these fluids.

Antigens used in this test should be standardized by intradermal injection in a series of patients who have never suffered from infestation with any helminths. As occasional fluids fail to cause a response in patients with hydatid disease who are known to react with other samples of hydatid fluid, it is equally essential to test the fluid on a patient known to be sensitive to hydatid antigen. This is particularly important when the fluid is obtained from a single human cyst. Mixed samples of fluid from uncomplicated cysts of sheep are usually satisfactory antigens.

SENSITIZATION TO HYDATID ANTIGEN AND TO HOST PROTEIN.

Occasionally persons failing to react to the first injection of hydatid fluid were observed to develope immediate or delayed reactions at a later date, though they showed no evidence of hydatid disease. An example of this was given in a previous paper.[1] As the original fluids were known to be antigenic, this suggested the possibility of general or local sensitization either to host protein or to hydatid antigen. Experiments were performed to determine whether such sensitization could be induced.

### Active Local Sensitization.

Patients showing no clinical or biological evidence of hydatid disease were injected intradermally either with sheep serum or with hydatid fluid which had been boiled for an hour to remove host protein. The injected area was demarcated with silver nitrate to insure reinjection in the same site.

#### *Sheep Serum.*

The serum was diluted with normal saline solution (0·9%) to the strength required and was filtered through a Seitz filter to insure sterility.

CASE I.—Five intradermal injections of the serum were given in the same area, 0·4 cubic centimetre of a dilution of one in 500 constituting the original injection. On the fifth and eighth days the same amount of a one in ten solution was injected. On the fourteenth and thirty-third days 0·3 cubic centimetre was given, the strength of the solution on the former occasion being one in 500, on the latter one in ten. No reactions followed these injections. On the twenty-fifth day, however, 0·3 cubic centimetre of a one in ten dilution of sheep serum, injected subcutaneously in the above site, led to a mild delayed reaction with infiltration (six by four centimetres) and slight œdema. Similar injections in the other arm on the twenty-fifth day intradermally and on the thirty-third day subcutaneously failed to elicit any reaction.

CASE II.—This patient received 0·4 cubic centimetre of a one in 500 dilution of sheep serum at the first injection and similar quantities of a one in ten solution on the fifth and tenth days. Injections of 0·3 cubic centimetre of the serum were given intradermally in this same area in a strength of one in 500 on the fourteenth day and of one in ten on the twenty-fifth day. No reactions followed any of these injections.

No evidence of sensitization of the skin itself was obtained in either of these patients, but a mild local sensitization of the subcutaneous tissues to sheep serum appeared to be present in the first patient on the twenty-fifth day.

#### *Boiled Hydatid Fluid.*

Clear hydatid fluid collected from numerous cysts of sheep was boiled for an hour in the water bath to remove any host protein. Kellaway[4] has shown that boiling for this length of time destroys sheep serum protein which can no longer be demonstrated in anaphylactic experiments with guinea-pigs.

CASE III.—This patient received 0·8 cubic centimetre of the fluid intradermally without any reaction either on this occasion or after a similar injection of 0·4 cubic centimetre in the same area on the fifth day. Repetition of this injection three days later was followed by a mild immediate reaction and on the fourteenth day a definite wheal resulted from the intradermal injection of 0·3 cubic centimetre of the fluid in the same area. A similar test on the twentieth day produced a wheal 2·4 by 2·4 centimetres in diameter and the reaction was even more definite on the thirty-third day. No delayed reaction followed any of these injections. On the twenty-fourth and thirty-third days similar injections in other distant areas of skin failed to elicit either phase of the reaction.

CASE IV.—This patient received 0·8 cubic centimetre of the fluid in the skin of the right arm on the first occasion and on the fifth day 0·4 cubic centimetre of this antigen was injected intradermally in the same site without eliciting any reaction. On the tenth day a similar injection produced a borderline immediate response, while on the fourteenth day the use of 0·3 cubic centimetre of fluid resulted in a wheal 2·6 centimetres in diameter. A similar response was again obtained in this area on the twentieth day. No delayed reaction followed any of these injections nor was any noted on the twenty-fourth day after the subcutaneous injection of 0·3 cubic centimetre of the fluid into this site. On the tenth and eighteenth days 0·4 and 0·3 cubic centimetre of the antigen injected intradermally in the opposite (left) arm failed to elicit either phase of the reaction. On the latter day 0·3 cubic centimetre of a 1% saline extract of scolices was also injected intradermally in the left arm. The mode of preparation of this extract will be given later. No immediate reaction followed, but twenty-four hours later a typical delayed response with infiltration of an area five by six centimetres was present. Six days later 0·3 cubic centimetre of boiled hydatid fluid was injected into the skin of the abdominal wall and of the left arm. Neither an immediate nor a delayed reaction followed in the abdominal site. A larger wheal than any previously observed in the left arm appeared, but the response was recorded as negative, as the wheal was only two centimetres in diameter. In twenty-four hours a delayed response with infiltration of an area five by nine centimetres was present in this arm. These various injections in the left upper arm were not given in any specially marked out area, but some of them were obviously given in an area previously injected.

These two cases provide definite evidence of local sensitization to hydatid antigen in reinjected areas and an absence of general sensitization.

#### *Commentary on These Experiments.*

Repeated intradermal injections of host protein (sheep serum) failed to produce either general or local sensitization of the skin itself as evidenced by the absence of the immediate wheal, whereas hydatid fluid from which host protein had presumably been removed by boiling, proved an efficient agent for local sensitization of the skin. The immediate reaction may be elicited first about the eighth day, is more strikingly demonstrated by the fourteenth day and may be obtained at least a month after the

original injection. There was no evidence that general sensitization followed these injections.

In one case a mild delayed reaction was noted on the twenty-fifth day following repeated injections of sheep serum in a localized area, while one patient yielded delayed reactions to intradermal injections of hydatid antigen in a relatively limited area on the eighth and fourteenth days after the first injection of boiled hydatid fluid in this vicinity. It is apparent that local sensitization of the subcutaneous tissues as shown by the appearance of a delayed reaction may also rapidly follow the injection of hydatid fluid in a limited area.

The practical application of these observations is important. It is necessary in retesting a patient for these reactions to avoid using an area of skin which has been utilized previously for the test. Most observers automatically use the same area of skin in every patient tested. It is possible that the persistence of these reactions in patients for many years after an operation for hydatid disease (a finding noted by numerous workers) is in some cases due to local sensitization of the tissues from previous injections of hydatid fluid in a limited area on the occasion of former tests.

#### Passive Transfer of Local Hypersensitiveness.

Prausnitz and Küstner[8] in 1921 published experiments on the passive transfer of local hypersensitiveness. Though Botteri[9] failed to produce local tissue anaphylaxis by a modified form of their experiment, their results were confirmed by Rackemann and Stevens[10] who injected intradermally into five normal persons small amounts of serum obtained from two patients recently operated on for hydatid disease. Twenty-four hours later the injected sites showed an immediate response to the intradermal injection of hydatid fluid, but negative results were obtained elsewhere. No reaction followed the injection of other protein extracts in these prepared areas.

In our experiments serum fixing forty minimum hæmolytic doses of complement with hydatid antigen was obtained from a patient harbouring residual cysts. Two patients with no evidence of hydatid disease received intradermal injections of 0·3 cubic centimetre each of filtered hydatid fluid, saline extract of hydatid scolices and saline extract of *Tænia saginata*. No reaction occurred within half an hour. In four other sites the patients then received intradermal injections of 0·5 cubic centimetre of the human serum. An injection of 0·3 cubic centimetre of the serum was also given in the area previously injected with hydatid fluid with the production of an indefinite response in both cases. After thirty and forty-five minutes respectively intradermal injections of 0·3 cubic centimetre of filtered hydatid fluid, scolex extract, saginata extract and sheep serum diluted one in ten with normal saline solution were given into the fading wheals resulting from the human serum. No reaction followed the injection of sheep serum, but with the other three antigens in both cases there was a slight increase in the area of the wheals and a marked infiltration, so that a swelling the size of a small egg resulted in each injected site. This was surrounded by a wide area of erythema. There was obviously a considerable reaction of the subcutaneous tissues. Itching was complained of in the sites last injected with hydatid fluid and scolex extract. Twenty-four hours later there was no sign of any delayed reaction.

#### General Sensitization.

Botteri[9] found that in eleven of twelve patients in whom there was no evidence of hydatid infestation, a single subcutaneous injection of from 1·5 to 60 cubic centimetres of hydatid fluid from human cysts led to the development of general sensitization to this antigen after an interval of eight to ten days. This was shown by the occurrence of a delayed reaction to an intradermal injection of the fluid. In most cases from three to five cubic centimetres of the fluid were used. Sensitization lasted from two to eight weeks or longer. Similar results were obtained in two cases where fluid from cysts of cattle was used, each patient receiving thirty cubic centimetres of fluid subcutaneously and five cubic centimetres intravenously.

From one to three intradermal injections of 0·1 to 0·2 cubic centimetre of the fluid at intervals of a few days gave similar results in the seven patients tested, though sensitization usually did not last longer than a month.

Results were not so successful with repeated intravenous injections of from one to five cubic centimetres of the fluid. One patient, given 350 cubic centimetres of the fluid *per os* in the course of a week, showed a slight delayed response to tests between the sixth and the twelfth days.

Two patients were passively sensitized by the injection in one of 300 cubic centimetres subcutaneously of the mixed serum of four patients sensitized to hydatid antigen and in the other of 135 cubic centimetres of the serum intravenously. Success did not attend the intravenous injections of smaller amounts (ten to twenty-eight cubic centimetres) of the serum.

The intravenous injection of from three and a half to five cubic centimetres of hydatid fluid in patients actively or passively sensitized to this antigen led to symptoms of mild anaphylactic shock and in the latter case this was followed by permanent desensitization. More severe symptoms followed such an injection in patients who had acquired their sensitization in the course of hydatid disease and in one fifteen cubic centimetres of hydatid fluid *per os* led to a similar result.

Kellaway[5] obtained evidence of general sensitization with both immediate and delayed reactions in himself after four subcutaneous injections of filtered sheep hydatid fluid at intervals of three days (the test injections being made in areas not previously injected). Twelve months later, however, evidence of sensitization to sheep serum was still present.

Mogena[11] refers to one patient who originally failed to react to the intradermal test. After the

injection of hydatid fluid at intervals of about a month, the response became positive and remained so for some months. Escudero, Escudero and Peco[12] from experiments on twenty subjects concluded that the intradermal reaction for hydatid disease loses its value as a diagnostic test after the first injection, since the introduction of hydatid antigen into patients free from cysts renders them liable to react to subsequent injections. The two latter original papers are unfortunately not available, but it appears that they refer to general rather than local sensitization following injections of hydatid antigen.

Our experiments detailed above showed no evidence of general sensitization of the patients following repeated intradermal injections of boiled hydatid fluid over a period of about a month.

In an attempt to produce general sensitization to hydatid antigen relatively large doses were given subcutaneously to four patients, bedridden, whose ages ranged from fifty-five to seventy years. Two received total doses of fifty-four and fifty-six cubic centimetres of filtered hydatid fluid. These amounts were given as three injections in different areas at intervals of a few days. Two other patients were injected subcutaneously with boiled hydatid fluid, one receiving a single injection of ten cubic centimetres, the other being given a total of sixty cubic centimetres, in four separate injections in different areas at three-day intervals. In none of these patients was there any evidence of the occurrence of general sensitization. Three were tested as late as the thirty-first day, while in one no test was done after the twenty-first day from the first injection. Four similar injections of host protein totalling sixty cubic centimetres of sheep serum of a dilution of one in ten also failed to reveal any evidence of general sensitization in another patient by the thirty-first day.

That such negative results were probably dependent on the small antigenic content of these fluids was suggested by the successful production in one patient of general sensitization to hydatid antigen following the use of a 1·0% saline extract of scolices subcutaneously. The preparation of this extract is dealt with later. Two injections of ten and sixteen cubic centimetres respectively were given in different areas at an interval of three days. On the seventh day 0·4 cubic centimetre of the same antigen given intradermally led to immediate and delayed reactions. Positive reactions with both phases of the test were invariably elicited during the next five weeks. A further subcutaneous injection of ten cubic centimetres of the same antigen was then given in another area. No reaction followed this injection. Three days later the use of 0·3 cubic centimetre of the extract intradermally showed that though the immediate phase of the reaction persisted, the delayed phase had disappeared, probably as a result of desensitization of the subcutaneous tissues by the preceding relatively large injection. This is exactly analagous to the disappearance of the delayed reaction in patients in the first few days after operation for hydatid disease or after the supervention of some complication in the cyst leading to excessive absorption of antigen. Seven weeks later both phases of the reaction were elicited by the intradermal injection of 0·3 cubic centimetre of hydatid antigen in different areas.

The effect of repeated small doses of hydatid antigen subcutaneously in the same area was also investigated in three patients.

One patient received 0·4 cubic centimetre of filtered hydatid fluid subcutaneously in the same area on the first and fifth days and on the eighth day an intradermal test in this area failed to give rise to a reaction. The intradermal injection of 0·4 cubic centimetre of this fluid in the same site on the tenth day yielded no immediate reaction, but a delayed response with infiltration and œdema of an area 7·5 by 4·5 centimetres. On the twenty-first day a similar injection of filtered fluid from the cyst of a pig did not lead to a delayed reaction, while the immediate wheal measuring two by two centimetres was recorded as "negative." No definite conclusions can be drawn from these results, but test injections in the other arm again showed the development of local sensitization from repeated intradermal injections. In this situation no reactions followed the intradermal injection of 0·4 cubic centimetre of filtered hydatid fluid on the first day nor of the same amounts of scolex extract and boiled hydatid fluid on the sixth day. Five days later, however, immediate and delayed reactions followed the injection of 0·4 cubic centimetre of filtered hydatid fluid, while on the twenty-first day no reactions resulted from similar tests with sheep serum and with hydatid fluid from the pig.

Another patient after the subcutaneous injection of 0·4 cubic centimetre of boiled hydatid fluid in the same area on the first and fourth days failed to give any definite evidence of sensitization to hydatid antigen by the twentieth day; this makes it difficult to interpret the results of a similar experiment in the following case.

The patient was given 0·4 cubic centimetre of boiled hydatid fluid subcutaneously in a marked out area on the first and fifth days. Intradermal tests with this antigen on the eighth day in the same area and on the tenth day in the opposite arm elicited definite immediate and delayed reactions. Similar results were obtained on the fifteenth day with boiled hydatid fluid in the same site and with scolex extract in the opposite arm. With filtered hydatid fluid on the twenty-fifth day similar reactions were obtained in the original area and in the opposite arm.

This patient manifested such rapid development of general sensitization of the skin and subcutaneous tissues to hydatid antigen as compared with the other patients subjected to these experiments that we suspect that he may have been harbouring some parasite of the Tæniidæ family.

The intradermal test was not performed before the experiment started, though no delayed reaction followed the two original subcutaneous injections. The complement fixation test for hydatid disease also failed to elicit a reaction two days before the first injection. There was no clinical evidence of hydatid disease. Unfortunately the patient was not investigated for infestation with other helminths as at the time of this experiment their importance was not fully appreciated.

It would appear that local sensitization is a common event after the use of hydatid fluid for the intradermal test in patients free from hydatid disease, but general sensitization, if it occurs at all, is very rare with the small doses of the relatively weak antigens used.

### INFESTATION WITH OTHER HELMINTHS.

On the analogy of the group reactions met with in helminthic infestations generally and owing to our experience of the efficacy of *Tænia saginata* extracts as antigens for the complement fixation test in echinococcosis, it was decided to investigate the intradermal reactions with the use of filtered hydatid fluid, a 1% saline extract of hydatid scolices, a 1% saline extract of the tapeworm, *Tænia saginata*, an 0·2% saline extract of the round worm, *Ascaris lumbricoides*, and a 1% saline extract of the liver fluke, *Fasciola hepatica*, as antigens. An antigen prepared from bilharzial cercariæ was also used in a few instances. Thus, in addition to hydatid antigens there were others representative of the three large classes of helminths, the cestodes, trematodes and nematodes. This allowed an investigation of the nature of the group reactions with extracts of worms of the same family (Tæniidae) as *Tænia granulosus* (Batsch) as well as with the more distantly related flukes and round worms.

### The Preparation and Standardization of Antigens.

After being tested for sterility by cultural methods and animal inoculations the fluids were stored on ice. They were standardized by injecting them into a number of patients in whom there was no evidence of hydatid disease.

#### *Filtered Hydatid Fluid.*

The preparation of filtered hydatid fluid for use as an antigen was detailed in the introduction to this paper. It was standardized as mentioned above, negative results being uniformly obtained.

#### *Scolex Extract.*

Scolices collected from hydatid cysts of sheep were ground to a fine powder and dried in a desiccator. One gramme of the powder was added to one hundred cubic centimetres of normal saline solution (0·9%) and was boiled over a flame for twenty minutes. After incubation at 37° C. overnight, the supernatant fluid was pipetted off and stored in test tubes. Forty-two patients received intradermal injections of 0·3 cubic centimetre of this extract and all failed to show either immediate or delayed reactions.

#### *Saginata Extract.*

Numerous segments of a worm, *Tænia saginata*, obtained from a human host were washed in saline solution, dried in a desiccator and ground to powder. One gramme of this powder was added to one hundred cubic centimetres of normal saline solution and this was shaken thoroughly for one hour and then filtered through a Seitz filter and ampouled. Thirty-six patients were given 0·3 cubic centimetre of this extract intradermally. None showed an immediate reaction, while only one gave an indefinite delayed response. This patient had a history of intestinal infestation in childhood.

#### *Fluke Extract.*

Flukes (*Fasciola hepatica*) collected from the livers of sheep were bruised and thoroughly washed with water and with normal saline solution. They were then dried in a desiccator and ground to fine powder, 0·5 gramme of which was added to fifty cubic centimetres of normal saline solution. After having been shaken for twenty minutes, this was filtered through a Buchner filter funnel to remove course particles and then through a Seitz filter and placed in ampoules. This extract was standardized in a few cases only, as it showed no tendency to give rise to reactions in hydatid or any other disease.

#### *Bilharzial Extract.*

The livers of snails (*Planorbis exustus*) containing cercariæ of *Schistosoma spindalis* were ground to fine powder. Of this 0·25 gramme of the powder was shaken with fifty cubic centimetres of normal saline solution and incubated for one hour. It was well shaken on several occasions in this period. After centrifugalization the supernatent fluid was filtered through a Seitz filter and placed in ampoules. Twenty-four patients who received 0·3 cubic centimetre of this extract intradermally, failed to show any response.

The uniformity of the negative results with all these antigens was very striking, but a survey of patients injected with an ascaris extract showed a high percentage of reactions.

#### *Ascaris Extract.*

The worms collected from pigs (*Ascaris sulla vel lumbricoides*) were thoroughly washed with water and normal saline solution and were cut into small pieces. They were dried in a desiccator and ground to a fine powder, half a gramme of which was added to 250 cubic centimetres of normal saline solution and shaken for twenty minutes. Filtration was effected through a Buchner funnel and then through a Seitz filter. The slightly opalescent filtrate was stored in ampoules.

Eleven (29·7%) of thirty-seven patients tested with this extract gave positive immediate reactions. Four of these were aliens. Of the other seven three gave a history of infestation with another nematode, *Oxyuris vermicularis*, while in two this aspect of the history was not recorded. The delayed reaction was investigated in only nine patients, one of whom gave a positive response. This patient had suffered from threadworms. In thirteen persons with threadworm infestation, past or present, immediate reactions to ascaris extract were obtained in six (46·2%), while delayed response was present in three (23·1%). We regard the high incidence of reactivity to this antigen as evidence of a group reaction to a nematode antigen rather than as a specific response to *Ascaris lumbricoides*, since infestation with *Oxyuris vermicularis* is common in this country.

Fülleborn[13] found that seven patients infested with *Strongyloides stercoralis* all yielded positive

immediate reactions to antigens made from powdered strongyloid larvæ and from *Ascaris lumbricoides* when tested by inoculation of scratches in the skin though there was no evidence of infestation with ascaris, past or present. Weak reactions to *Trichina spiralis* antigen were observed in three of these patients. He thinks that the response probably persists after infestation with strongyloides has ceased. In eleven of twelve persons in whom ascaris infestation was present or had existed previously, an immediate reaction was obtained with ascaris antigen. Two of them, aged forty-one and fifty-four years respectively, gave a history of ascaris infestation in childhood. The only patient harbouring this parasite at the time of the test failed to react to strongyloides antigen. There was also some evidence that the skin of the patient sensitized to ascaris may become in some degree sensitive to trichina antigen. These findings suggest a group reaction to a nematode antigen.

Rackemann and Stevens[10] having injected intradermally a filtered saline extract of *Ascaris lumbricoides*, found an immediate reaction in four of six patients tested. A wheal 1·4 centimetres in diameter was considered a positive response. In none of these persons was there a history of ascaris infestation, past or present, though their attention was directed to this investigation by the discovery of sensitization to ascaris in a student handling these worms. Intradermal injection of his serum twenty-four hours before the test caused a local sensitization of the skin of normal persons to ascaris extract. In the United States of America sensitization to ascaris antigen appears to be quite as common as in this country and it is probably a group reaction rather than a specific response to infestation with *Ascaris lumbricoides*.

### The Reactions After Operation in Persons Suffering from Hydatid Disease.

To compare the effects of these antigens in patients probably sensitized to hydatid antigen, thirty-four patients who had been operated on for echinococcal cysts from one to twenty years previously were selected. A reasonably high incidence of valid reactions to the intradermal test was expected in these individuals, since a previous analysis[1] had shown that in a similar post-operative series of patients over 90% of positive immediate reactions followed the intradermal injection of hydatid fluid. The somewhat lower incidence of such responses in this group is probably due to the larger dimensions of the wheal which we consider necessary for a positive result with this test.

All these patients were tested with six antigens and the results of these various tests are recorded in Table I. One of the patients did not return for the reading of the delayed reaction. A few patients were also tested with some of these antigens before their first operation for hydatid disease with results similar to those of the post-operative group.

#### *Hydatid Antigens.*

The results shown in Table I suggest that filtered hydatid fluid was a better antigen for eliciting the immediate response than the scolex extract. That this was not the case is demonstrated in Table II. Owing to the frequent occurrence of delayed reactions to three of the antigens in the one patient, two reactions often overlapped when the injections were given in the usual site a short distance above the elbow. When the difficulty of reading these overlapping reactions was recognized, it was decided to use one arm for filtered fluid, the opposite arm for saginata extract and one forearm for scolex extract. The other antigens were injected in either arm. The forearm was used for the scolex antigen in nineteen of the patients recorded in Table I.

In Table II the results are set forth in two series each of nineteen patients who had been subjected to operation for hydatid disease a year or more before the tests were investigated. In Group A filtered hydatid fluid was injected into one arm and scolex extract into a corresponding site in the other arm. Three of these patients did not report for the reading of the delayed response. In Group B the arm was used for the fluid and the forearm for the scolex extract.

In Group A there was little to choose between the two antigens injected in corresponding sites. When the arm was used for injection, immediate reactions occurred in about 20% more patients than those yielding delayed responses. Yet when the forearm was used for the injection of scolex extract, delayed reactions exceeded the immediate responses by 15·8%. Obviously the forearm is not as suitable a site as the arm for eliciting the immediate reaction, though it may be more satisfactory for the delayed response. The thicker layer of skin in the arm may confine the antigen more effectively to the epidermis itself with the production of a wheal of maximal dimensions. From the relatively thin skin of the forearm leakage and diffusion into the subcutaneous tissue would occur with greater ease, with the result

TABLE I.

*Reactions to Various Helminthic Antigens After Operation in Patients with Hydatid Disease.*

| Antigen. | Immediate Response. | | | Delayed Response | | |
|---|---|---|---|---|---|---|
| | Reaction. | Doubtful. | No Reaction. | Reaction. | Doubtful | No Reaction. |
| Filtered hydatid fluid | 28=82·4% | 2 | 4 | 20=60·6% | 0 | 13 |
| Scolex extract | 24=70·6% | 0 | 10 | 21=63·6% | 1 | 11 |
| Saginata extract | 20=58·8% | 0 | 14 | 16=48·5% | 0 | 17 |
| Ascaris extract | 8=23·5% | 1 | 25 | 2= 6·1% | 1 | 30 |
| Fluke extract | 0 | 0 | 34 | 0 | 0 | 33 |

TABLE II.

*The Effect of the Site of Injection on the Response to the Intradermal Test.*

| Group. | Site of Injection. | Antigen. | Immediate Response. | | | Delayed Response. | | |
|---|---|---|---|---|---|---|---|---|
| | | | Reaction. | Doubtful. | No Reaction. | Reaction. | Doubtful. | No Reaction. |
| A | Arm | Hydatid fluid | 14=73·7% | 1 | 4 | 9=56·3% | 0 | 7 |
| | Arm | Scolex extract | 13=68·4% | 1 | 5 | 8=50% | 1 | 7 |
| B | Arm | Hydatid fluid | 16=84·2% | 1 | 2 | 12=63·2% | 0 | 7 |
| | Forearm | Scolex extract | 11=57·9% | 1 | 7 | 14=73·7% | 0 | 5 |

that a more pronounced delayed response and a less definite immediate wheal would appear.

The results with scolex extract are, therefore, not strictly comparable with those of the other antigens named in Table I. The use of this extract in many other cases of hydatid disease has shown that it gives rise to results closely corresponding to those obtained with filtered hydatid fluid. The use of an extract of hydatid scolices as an antigen was first introduced by N. H. Fairley[14] for complement fixation work and for the past two years its efficacy for eliciting responses in the intradermal test has been under investigation. Fülleborn[15] uses powdered scolices for the test and applies the powder to scratches in the skin.

*Saginata Antigen.*

From Table I it is seen that in 58·8% of patients with a history of hydatid disease but none of intestinal tapeworm infestation an immediate reaction followed the intradermal injection of an extract of *Tænia saginata,* while delayed reactions with this extract were observed in 48·5%. These figures are not far removed from those obtained with hydatid antigens.

One patient infested with *Tænia saginata* at the time of the tests but presenting no evidence of hydatid disease, received intradermal injections of 0·3 cubic centimetre each of filtered hydatid fluid, scolex extract, saginata extract and diluted sheep serum. Readings were made in half an hour. The wheal from the sheep serum control measured only 1·0 by 0·8 centimetre. The wheal with hydatid fluid increased to a size of 1·6 by 1·6 centimetres and there was some surrounding erythema and a slight tendency to the formation of pseudopodial outrunners. These were very obvious in the wheals from the scolex and saginata extracts which reached a size of 2·5 by 2·0 and 3·0 by 2·0 centimetres respectively. Both of these were definite immediate reactions. After twenty-four hours it was ascertained that there were no delayed reactions. Another patient with a history of infestation with *Tænia saginata* some twenty years previously did not manifest any reaction with these four antigens. A third patient had been passing segments of a tapeworm for eighteen months, but gave no history of infestation with other helminths. An immediate reaction followed the injection of an extract of *Tænia saginata,* but tests with filtered hydatid fluids derived from sheep and from the pig and with an extract of cercariæ of *Schistosoma spindalis* did not lead to any immediate results. A positive response was obtained with ascaris extract. Delayed reactions were not read.

An experiment detailed earlier in this paper revealed that a patient was sensitized to hydatid antigen by the subcutaneous injection of a scolex extract. At the same time he developed sensitization to an extract of *Tænia saginata.* Thus, though no reaction followed intradermal tests with saginata antigen on the seventh, thirteenth and sixteenth days, an immediate response was obtained on the forty-fifth day in an area not previously tested. The delayed reaction was not elicited in this patient with saginata antigen, though an immediate response was again observed seven weeks later in a site which had perhaps been used for one of the earlier injections. A similar experiment in another patient with the use of *Tænia saginata* antigen yielded corresponding results.

The extract was prepared as follows:

The worm was obtained from a human host and was thoroughly washed, dried and powdered. One gramme of the powder was added to one hundred cubic centimetres of normal saline solution and was boiled over the flame for ten minutes. It was tested for sterility and stored in large test tubes on ice.

The patient received subcutaneous injections in different areas of ten, five and ten cubic centimetres of the extract on the second, fifth and sixth days of the experiment. The last injection was followed by a definite delayed reaction. On the first day intradermal tests with this extract and with boiled hydatid fluid and scolex extract had not been followed by a reaction. On the eighth day an intradermal test with the saginata extract yielded a doubtful immediate but no delayed response. On the seventeenth day intradermal tests with this extract and with boiled hydatid fluid resulted in positive immediate but no delayed reactions to both antigens, while the response to a test with scolex extract was recorded as a doubtful immediate (wheal 2·2 by 2·0 centimetres) and no delayed reaction. As early as the tenth day, positive results were obtained with the complement fixation test using as antigens saginata and scolex extracts, while by the fourteenth day a positive result was obtained when hydatid fluid was used for this purpose.

We found *Tænia saginata* extracts satisfactory antigens for the complement fixation test in patients sensitized to hydatid antigen either experimentally or in the natural course of the disease. Steinert[16] reports a positive result with the complement fixation test with hydatid antigen in a patient from whom a cyst of *Cysticercus cellulosæ* had been removed before the test. There was no evidence of hydatid disease. Lemaire and Thiodet[17] obtained

equally satisfactory precipitin reactions in the serum of patients with hydatid disease when either hydatid fluid or that from the parasite *Cysticercus tenuicollis* was used.

Fülleborn[15] quotes a case of hydatid disease investigated by Vogel and Schachsuwarly. Positive immediate reactions followed the inoculation of superficial scratches with either a powdered scolex antigen or a powder made from *Cysticercus tenuicollis*. Deusch,[18] using only the delayed reaction, did not obtain any positive results with the intradermal injection of hydatid fluid in patients with tapeworm, ascaris or oxyuris infestations.

It appears that the biological reactions in hydatid infestation are not strictly specific reactions for *Tænia granulosus* (Batsch), but are non-specific reactions for the family of the Tæniidæ at least. In countries where other tapeworm infestations are at all common, no reliance can be placed on the intradermal reaction as a specific diagnostic test for hydatid disease. It is obviously necessary to exclude such infestation, past or present, when reactions to hydatid antigen are observed in patients in this community. Though no evidence is available to show how long after the cure of the infestation with *Tænia saginata* the reaction to the intradermal injection of hydatid antigen will remain, it is known that in hydatid infections sensitization may persist for some years at least and Fülleborn[13] has shown that in cases of ascariasis sensitization to ascaris antigen is also present for years after apparent cure. N. H. Fairley and Williams[19] demonstrated a similar persistence of sensitization to bilharzial extracts in persons cured of schistosomiasis.

In other helminthic diseases also there is evidence that the biological responses are not strictly specific, but show a group specificity to helminthic antigens of the same family and even of the same class. Thus N. H. Fairley[20] demonstrated that antigens prepared from *Schistosoma mansoni* or *Schistosoma hæmatobium* were equally efficacious for the complement fixation test in patients infested with either or both of these parasites and later he[21] reported that cercarial extracts of *Schistosoma spindalis* were efficient antigens for detecting *Schistosoma hæmatobium* in man or *Schistosoma indicum* and *Schistosoma spindalis* in goats. Fülleborn[13] has shown that patients harbouring *Strongyloides stercoralis* become sensitized to both strongyloides and ascaris antigens as judged by the immediate wheal with the scratch test.

*Nematode Antigen.*

In nine patients with threadworm infestation, past or present, no reactions followed the intradermal injection of hydatid fluid or saginata extract.

In thirty-four patients previously operated on for hydatid disease, the intradermal injection of ascaris extract was followed in eight (23·5%) by an immediate reaction, but a delayed response occurred in only two. In a control series of thirty-seven patients with no evidence of hydatid disease the delayed response was not investigated, but an immediate reaction occurred in eleven (29·7%). In thirteen persons infested with *Oxyuris vermicularis* 46·2% gave an immediate and 23·1% a delayed reaction with ascaris extract. One patient who had passed a round worm fourteen months previously, still yielded immediate and delayed responses when tested with ascaris antigen, though no reaction followed the intradermal injection of hydatid fluid. These findings do not lend support to the view that sensitization to nematode antigens is likely to result from hydatid infestation.

Fülleborn,[15] however, found an immediate reaction to the intradermal injection of hydatid fluid in two patients infested with *Strongyloides stercoralis*, but with no evidence of hydatid disease. He mentions a case investigated by Vogel and Schachsuwarly of a patient with hydatid disease in whom immediate reactions not only to scolex antigen but also to antigens prepared from trichinæ and strongyloides larvæ were elicited.

Parisot and Simonin[22] sensitized guinea-pigs by the intracardiac injection of 0·5 cubic centimetre of hydatid fluid. Fifteen days later typical anaphylactic shock was produced by the intracardiac injection of 0·5 cubic centimetre of parenteral fluid from *Ascaris megalocephala*, the fluid being diluted twenty times with normal saline solution. A similar injection was without effect in control animals.

Unpublished experiments by Kellaway, in which guinea-pigs sensitized with either ascaris, *Tænia saginata*, hydatid scolex or fluke extracts were tested by intravenous injections of these helminthic extracts or by the reactions of the isolated uterus, afford clear evidence of the lack of strict specificity displayed by helminthic antigens in these reactions. For example, guinea-pigs sensitized with scolex extracts, could be killed by the intravenous injection of *Tænia saginata* extract in doses which were without effect in normal guinea-pigs. The symptoms presented were indistinguishable from those of fatal anaphylaxis. Animals sensitized with ascaris or with saginata extracts reacted with scolex extracts almost as well as with the extract to which they had been sensitized. Similar results were obtained in experiments with the isolated plain muscle.

Ramsdell[23] found no reaction to the intradermal injection of an aqueous extract of *Tænia saginata* in thirteen normal patients used as controls, but in patients previously infested with this tapeworm the injection of this antigen was followed by an immediate reaction associated also with symptoms of asthma or hay fever which disappeared in about twenty minutes. A similar reaction was observed in two cases with ancylostoma and strongyloides infestation.

It appears that cross sensitization to antigens of helminths of a different class from that of the infesting worm may occur and in some cases of hydatid disease the patient may thus become sensitized to antigens derived from nematode parasites.

*Trematode Antigens.*

Intradermal tests with an antigen derived from the liver fluke *Fasciola hepatica* gave uniformly negative results in thirty-eight patients with hydatid disease. As this extract did not lead to a reaction in any patients, including some suffering from bilharzia, there is doubt as to its efficacy as an antigen.

Of eleven patients with evidence of past or present bilharzia, only one yielded an immediate response to the intradermal injection of filtered hydatid fluid. This reaction was confirmed on retesting a few months later. Control injections of saline solution and sheep serum gave negative results and no whealing followed the stroke test. Clinical examination as well as the complement fixation test for hydatid failed to reveal any evidence of this infestation. Latent echinococcosis cannot, however, be definitely excluded in this case.

Of fourteen patients with hydatid disease only one gave a positive immediate reaction to the injection of a bilharzial antigen, the preparation of which has already been detailed. As a triple response to the stroke test (see later) was obtained in this patient, the positive result is of no significance.

*Summary.*

Immediate and delayed reactions to the intradermal test with hydatid antigen may occur in patients who have at some time harboured tapeworms other than the cystic stage of *Tænia granulosus* (Batsch). There is evidence that similar fallacious reactions may occur in certain patients with nematode and trematode infestations. For the proper interpretation of a positive response to the intradermal test for hydatid disease it is obviously essential to exclude these other helminthic infestations, past or present.

**Urticaria and Allied Conditions.**

*The Stroke Test.*

Many observers have recorded pseudopositive reactions in cases of abnormal responsiveness of the skin to trauma. An excellent example of this is dermatographism or factitious urticaria. Dew, Kellaway and Williams[24] stated that in the interpretation of a positive immediate response great care was necessary in the presence of generalized skin disease or of urticaria related to abnormal sensitiveness to foreign protein. Kellaway[25] later added dermatographism to this group. K. D. Fairley[1] found that among thirty-five patients yielding fallacious immediate reactions there was one patient with a history of angioneurotic œdema and three with a history of urticaria. In the only two patients suffering from hydatid disease with a story of recent urticaria, was no immediate response obtained. Hercus[26] in two similar cases obtained corresponding results. When there is a history of recent urticaria, no significance can be attached to the immediate response, whether it be positive or negative.

In the investigation of the intradermal test for schistosomiasis the only fallacious positive results found by N. H. Fairley and Williams[19] occurred in three patients who proved to be examples of *urticaria factitia*. According to Lewis[27] this is present in about 5% of healthy people. If the skin be stroked with moderate pressure with a blunt instrument, such as a soft metal probe with a rounded end, the normal response consists of a local red line confined to the area of pressure followed in fifteen to thirty seconds by a spreading flush or flare. Swelling and wheal formation over the line of the stroke (the so-called triple response) is characteristic of factitious urticaria. This is subsequently referred to as the stroke test. Fairley and Williams concluded that any patient presenting a triple response to firm stroking as described above, should be excluded as unsuitable for intradermal tests of this nature. The injection of normal saline solution was not invariably an adequate control in such cases. This applies equally to the intradermal reaction for hydatid disease and the stroke test should be performed on every patient submitted to the intradermal test. In any patient showing a triple response to stroking, an immediate result with the intradermal test should be discarded as of no significance. A positive delayed response is, however, of value in these persons, while failure to yield an immediate result has the usual importance, if no urticarial rash has been present in the preceding few weeks.

Two patients recently investigated showed pseudopositive immediate reactions to hydatid antigen, when the stroke test revealed that they were suffering from *urticaria factitia*. In one patient suffering from tertiary syphilis, the saline solution control did not give rise to a reaction, but in the other the injection of normal saline solution was followed by a wheal 2·2 by 3·1 centimetres in diameter with pseudopodial outrunners.

In another patient with a history of angioneurotic œdema no immediate reaction occurred with this test; the same was noted in three persons with a history of recent urticaria. In one the rash followed the ingestion of strawberries and four days later the immediate response to the injection of filtered hydatid fluid consisted of a wheal 1·6 by 1·7 centimetres in diameter, while that from the saline solution control faded rapidly. In the other two no increase in the size of the wheal occurred. One had suffered from an urticarial rash ten weeks previously and the other twelve days before had been the subject of a severe attack of biliary colic followed by urticaria and jaundice. Though in the latter case operation seven months previously failed to reveal an hydatid cyst, it is highly probable that one is present, for a delayed response with infiltration over an area of seven by eight centimetres followed the injection of boiled hydatid fluid. Six days later a recurrence of abdominal pain preceded a complaint of itching at the site of the injection and on examination it was found that the delayed reaction had reappeared here.

When one batch of pharmacologically inactive filtered hydatid fluid was being standardized by testing it on thirty-seven control patients, one pseudopositive reaction (wheal 2·6 by 2·2 centimetres) was observed in a patient with pruritus. The stroke test did not lead to a triple response, but the presence of other helminths was not excluded.

The use of the stroke test and the more exacting standards now applied should result in a reduction of the number of fallacious positive reactions occurring in these cases.

### Jaundice.

With the adoption of the standards advocated for a positive response there is also little likelihood of pseudopositive reactions occurring in jaundiced patients. Dew, Kellaway and Williams[24] advised that great care should be exercised in the interpretation of immediate reactions in patients with jaundice and pruritus. Table III shows details of forty-two patients with jaundice who did not react to the test. The same occurred in the series analysed by K. D. Fairley[1] who found no fallacious positive results in jaundiced patients, probably because due care was exercised in the interpretation of reactions. The occurrence of a pseudopositive response in the patient with pruritus mentioned above suggests that occasionally pruritus may be responsible for fallacious positive results in persons in whom it is associated with jaundice. Of the patients detailed in Table III six are known to have been suffering with pruritus, while in only one of the remaining thirty-six was the absence of pruritus recorded.

### Asthma.

Since the adoption of the present standards for the test eleven asthmatics have been investigated with uniformly negative results. Hercus[26] recorded fallacious positive results in persons with hay fever and asthma, while Dew[28] also regards it as a potential source of error.

### Syphilis.

K. D. Fairley[1] found seven persons with syphilis among thirty-five patients who yielded pseudo-reactions to the injection of hydatid fluid. They were not investigated for infestation with other helminths nor were they subjected to the stroke test.

Of twenty syphilitics, mostly in the tertiary stage, who were recently investigated, only one gave an immediate reaction, but he also showed a triple response to the stroke test. Hallam[29] observed the development of well marked dermatographism during the course of secondary syphilis. He states that a high incidence of urticaria has been described in syphilitics. Harris, Lewis and Vaughan[30] recorded the case of a patient who manifested both urticaria and paroxysmal hæmoglobinuria on exposure to cold. This patient reacted to the Wassermann test. The skin reaction to cold took the form of a purely local triple response.

Apart from the one patient mentioned above as yielding an immediate reaction to the test, the largest wheal (2·0 by 1·5 centimetres) with hydatid fluid in this syphilitic group occurred in a patient with a history of threadworm infestation. In this patient a positive response (2·8 by 4·4 centimetres) followed the injection of ascaris extract. Examination of the stools showed no evidence of ascaris infestation. The adoption of the technique and standards advocated later for this test should reduce, if it does not abolish, the incidence of fallacious reactions in this group.

### Technique and Standardization of the Test.

More exacting standards and controls for the positive immediate response to this test are recommended with the object of diminishing or abolishing the growing list of pseudo-reactions reported by numerous observers. Accurate measurements of the immediate wheal and of the area of infiltration in the delayed reaction are essential if the results

TABLE III.

*Patients with Jaundice who did not react in the Immediate Phase of the Intradermal Test.*

| Pruritus. | Diagnosis. | Methods of Diagnosis. | | | Total. |
|---|---|---|---|---|---|
| | | *Post mortem* Examination. | Operation. | Clinical. | |
| Present | Cholelithiasis | 0 | 3 | 0 | 3 |
| | Carcinoma of— | | | | |
| | (*a*) Biliary passages | 1 | 1 | 0 | 2 |
| | (*b*) Pancreas | 0 | 0 | 1 | 1 |
| Absent | Catarrhal jaundice | 0 | 0 | 1 | 1 |
| Not recorded | Catarrhal jaundice | 0 | 0 | 5 | 5 |
| | Subacute bacterial endocarditis | 1 | 0 | 0 | 1 |
| | Syphilis of the liver | 0 | 0 | 1 | 1 |
| | Cirrhosis of the liver— | | | | |
| | (*a*) Portal | 1 | 0 | 0 | 1 |
| | (*b*) Biliary | 0 | 1 | 0 | 1 |
| | Cholelithiasis | 0 | 11 | 2 | 13 |
| | Carcinoma of— | | | | |
| | (*a*) Liver | 1 | 0 | 4 | 5 |
| | (*b*) Biliary passages | 2 | 0 | 0 | 2 |
| | (*c*) Pancreas | 3 | 2 | 0 | 5 |
| | Sarcoma of liver | 1 | 0 | 0 | 1 |
| | TOTAL | 10 | 18 | 14 | 42 |

are to be assessed by subsequent analysis. In the past the results have been classified as "positive" or "negative" (reactions or failure to react) largely on impressions and as these varied with individual observers, an accurate comparison of their findings is almost impossible.

*The Antigen and Its Standardization.*

Though other antigens give satisfactory results with this test, the one in almost universal use consists of hydatid fluid derived from cysts of sheep. Sterility is generally insured either by passing it through a fine filter or by the addition of 2·0% chloroform. Prepared by either method it retains its antigenic properties for many months.

Before the fluid is used for diagnosis, it is necessary to prove its suitability as an antigen. This is done by testing it on a series of control patients in whom there is no evidence of hydatid or other worm infestations, to find if it contains pharmacologically active substances which may lead to fallacious positive results. It is equally necessary to test its antigenic properties on a patient known to give immediate and delayed reactions with an efficient antigen.

*The Site of Injection.*

In our opinion the site of election for the test is the skin of the outer half of the upper arm ten to fifteen centimetres above the elbow joint. This area is easy of access and the skin is sufficiently thick to allow the injection to be given intradermally without undue leakage into the subcutaneous tissues. Many observers use the skin of the volar surface of the forearm, but in this situation it is often difficult to give an intradermal injection of the required size without causing infiltration of the subcutaneous tissues and so adding a reaction of the deeper structures to the immediate response of the more superficial tissues. The results detailed above of tests with hydatid fluid and scolex extract in the arm as compared with those of scolex extract in the forearm show the superiority of the arm as a site for eliciting the immediate response. Serigós[31] advises the use of the skin area nearest the site of the cyst, as he states that the maximal reaction occurs in this situation. In one case of hydatid disease of the pelvis so tested, we found the reaction in the arm to be greater than in the skin of the abdomen.

*Sensitization from Previous Tests.*

If the test has been performed on the patient at some earlier date, it is essential that an area of skin some distance from the former site should be used for any subsequent test to avoid a fallacious result from local sensitization of the skin to the antigen injected on a previous occasion.

*Technique of the Injection.*

The skin is sterilized with alcohol without undue rubbing and a fine hypodermic needle is introduced bevel uppermost so that it can be seen through the skin on elevating its point. The fluid is injected intradermally to raise a white circular area of about one centimetre diameter resembling orange peel. The amount of fluid usually required to inject this area is about 0·25 cubic centimetre (four minims). A similar injection of normal saline solution (0·9%) a few centimetres from the site of the previous injection serves as a control.

*The Stroke Test.*

The skin of the other arm or forearm is then stroked with a blunt instrument with moderate pressure. The significance to be attached to the results of this test has been discussed previously.

*The Immediate Reaction.*

In a typical immediate reaction the wheal from the saline solution injection fades rapidly, while that from the hydatid fluid increases in size, usually becoming more definitely raised above the surface of the surrounding skin and also extending peripherally often with the formation of irregular pseudopodia-like outrunners. A moderate zone of erythema usually surrounds this wheal which reaches its maximal dimensions within half an hour and generally fades within an hour or so. Occasionally, in the first few minutes smaller wheals suddenly appear a few millimetres from the original raised area and in no obvious continuity with it, though later they unite with this central wheal. We have observed this phenomenon in persons with hydatid disease tested with saginata extract as well as with various hydatid antigens, in patients with schistosomiasis tested with bilharzial antigen and in a person with threadworm infestation injected with ascaris extract.

*The Standardization of the Immediate Reaction.*

The characteristic of an immediate reaction is the increase in the size of the wheal, but this must be considerable before a positive result is recorded. The absence of definite measurements of the size of the wheal which might safely be regarded as indicating reactions and no reactions respectively has in the past led to faulty interpretations on many occasions. Thus in the cases recently analysed by K. D. Fairley[1] many of the thirty-five fallacious positive results found would have been regarded as failure to react with our present standards and this was definitely shown to be the case in seven of them.

Of the four measurable factors in the immediate reaction, the extent of the erythema and the increase of the wheal above the surface of the surrounding skin are not measured, as the former is variable and the latter is so slight that very accurate instruments would be necessary to estimate it. The other two factors are recorded by measuring the diameters of the wheal with a ruler graduated in millimetres, though if a ruler be not available, a sixpence (diameter roughly two centimetres) and a shilling (diameter 2·4 centimetres) superimposed on the wheal serve as useful guides.

The presence of pseudopodia-like outrunners is always noted and they are taken into account by

measuring the wheal in its greatest diameter, which will always be from the extremity of one outrunner. The other diameter is measured approximately at right angles to the former. Thus the increase in the size of the central wheal and its outrunners are the two factors measured in the reaction.

The following standards have been adopted throughout this investigation. Reactions are recorded when the wheal measures at least 2·4 centimetres in one diameter or 2·2 centimetres in both diameters. Doubtful reactions, from which no definite conclusion can be drawn, but in which it is advisable to repeat the test in another area of skin, with particular attention to technique, are recorded when both diameters of the wheal are from 2·0 to 2·2 centimetres or when the smaller diameter is less than this, while the larger lies between 2·2 and 2·4 centimetres.

Failure to react is recorded when the wheal does not exceed 2·0 centimetres in any diameter or when the greater diameter is less than 2·2 centimetres and the smaller diameter is less than 2·0 centimetres.

If the wheal from the control injection of saline solution reaches the dimensions given above for a doubtful reaction, the patient is not a suitable subject for the test and a positive result with hydatid antigen must be disregarded.

It is realized that the adoption of these criteria for a positive response will reduce the number of immediate reactions obtained with this test in patients with hydatid disease. However, the reduction of the number of reactions in such patients will not be so great as to impair the efficiency of the test, while the elimination of many pseudo-positive responses will add greatly to its diagnostic value.

In the series investigated by K. D. Fairley[1] when these standards were not utilized, 80·8% of patients with hydatid disease before operation yielded an immediate reaction. He concluded that the chief value of the immediate reaction lay in the fact that no response correctly indicated the absence of hydatid disease in 96·8% of the patients. With our present standards many patients with echinococcosis will fail to yield an immediate response. The value of the test would thus be impaired unless the size of the wheal was invariably measured. When there is no immediate response, the smaller the wheal, the more certain would it be that hydatid disease was absent. In any large series of observations a diagnosis of the absence of hydatid disease would almost certainly be correct in about 95% of patients in whom the diameter of the wheal did not exceed 1·6 centimetres.

If the result of the test as described is negative, investigation along the lines suggested below is unnecessary for the interpretation. But where the response is recorded as doubtful or as positive, further investigations are required before the significance of such a result can be correctly interpreted. As K. D. Fairley[1] found only 87 (21·9%) of positive responses in 398 patients suspected of harbouring hydatid cysts, it is uneconomical both in regard to time and money to proceed with these extra investigations in any case until the immediate result of the test with hydatid fluid is known. This can be ascertained within half an hour.

### Investigations Necessary for a Correct Interpretation of an Immediate Response.

#### *Sensitization to Host Protein.*

The first fallacy to be excluded is sensitization of the patient to host protein which may have been present in the antigen used. When fluid from cysts of sheep has been used, this is tested by the intradermal injection of a one in ten dilution of filtered sheep serum in normal saline solution (0·9%) exactly as described above for hydatid fluid. Similar standards are used in recording the results, but in practically every case tested there is so little increase in the size of the wheal that no doubt exists regarding sensitization to the serum when a positive response is observed. In the latter case it is necessary to retest the patient with another hydatid antigen which does not contain sheep serum protein, to see if he is sensitized also to this antigen. For this purpose fluid obtained from a host other than the sheep may be used or that obtained from sheep cysts may be boiled for half an hour or so to remove host protein. It will be necessary if a positive result is again recorded with fluid obtained from cysts of cattle or pigs, to carry out a control test with the appropriate host protein.

#### *Other Helminths.*

Careful investigation should be made regarding past or present infestation with other helminths. Where other parasites of the Tæniidæ family are or have been present it is necessary to discard a positive result with hydatid fluid. This also seems advisable in cases of infestation with worms of the nematode or trematode class, though the evidence for this is not as strong as in the case of the Tæniidæ.

#### *Other Conditions.*

As already detailed fallacious reactions have been met with in syphilitics, but as syphilis is so common in the community, it has not yet been determined whether such reactions are an accidental finding or are definitely related to the vascular lesions associated with this infection. Information regarding the Wassermann reaction may therefore be valuable for the correct interpretation of the intradermal test. It is hoped that the adoption of the advocated standards and controls will greatly reduce, if it does not abolish the fallacious results in this group.

This applies also to cases of generalized skin disease or pruritus and to conditions such as urticaria, angio-neurotic œdema, hay fever and asthma. Their presence or absence should be recorded in every case.

### The Significance of the Immediate Response.

The technique described above for failing to elicit an immediate response and its interpretation is so

simple as to be within the powers of any practitioner, while the significance to be attached to such a finding is definite. If the wheal does not exceed 1·6 centimetres in diameter (that is the size of a threepenny piece), hydatid disease may confidently be excluded with the knowledge that it will prove correct in some 95% of cases. Few clinical or laboratory diagnostic tests in medical practice have an accuracy greater than this. The absence of a reaction to this test in a patient previously operated on for hydatid disease is strong evidence of cure.

On the other hand, the finding of a positive response to the intradermal injection of a suitable hydatid antigen necessitates further investigation and unless the practitioner can carry this out, he is not in a position to ascertain if the reaction is a genuine one. Furthermore, it is practically only in patients who have never been subjected to operation for hydatid disease, that a genuine immediate reaction can be interpreted as signifying the presence of active echinococcosis, as for some years after operation for this condition it is impossible to determine whether the skin sensitization is due to a living cyst or to a more remote infestation. K. D. Fairley[1] suggested that a reaction about ten years after the last operation for echinococcosis was strong evidence of the presence of another cyst. As repeated intradermal injections of hydatid antigen may cause sensitization of the patient for a variable period, the test should not be performed in the post-operative period except at long intervals, if the persistence of a reaction many years after operation is to be regarded as evidence of further infestation. It is suggested that the test should not be repeated at less than yearly intervals in the post-operative period. In this connexion it is interesting to note that we have observed general symptoms of anaphylactic shock following the intradermal injection of hydatid antigen in this test only in patients subjected to repeated tests in the post-operative period.

### The Delayed Reaction.

Some hours after the immediate reaction has faded, it is frequently found that at the site of inoculation of the hydatid fluid there is an area of erythema with subjacent induration due to œdematous infiltration of the part and local accumulation of eosinophile leucocytes. Though this reaction occasionally fades within twelve hours, the classical signs of inflammation with the exception of pain and tenderness are usually present at eighteen to twenty-four hours and the indurated area often has a definite edge similar to that observed in erysipelas. With intense reactions vesiculation at the site of inoculation with local heat, redness and extensive œdema perhaps extending from the shoulder to the hand may simulate erysipelas or cellulitis. But there are no general symptoms, such as fever and tachycardia, while the axillary glands are usually neither enlarged nor tender. Intense local itching is a frequent complaint, but pain and tenderness are rare. If possible, the delayed reaction should be read at about six hours and again between eighteen and twenty-four hours. In any case, it should be observed at the latter time. The presence of either infiltration or œdema is characteristic of a positive response, erythema alone being regarded as negative. The area affected must be at least four centimetres in diameter before a positive result is recorded and then only if there is no induration at the site of the control saline solution injection. If the delayed reaction is absent, the site of injection of hydatid antigen is often difficult to find in eighteen to twenty-four hours.

If a delayed reaction be observed, it is necessary to prove that it is a genuine response to hydatid antigen. Sensitization to host protein and the presence of other helminthic infestation must be excluded as described above. It is also necessary to avoid fallacious results from local and according to Botteri[8] from general sensitization following a previous injection of hydatid antigen. The other conditions mentioned in the discussion on the immediate reaction (syphilis, generalized skin conditions, asthma *et cetera*) do not apparently cause pseudopositive delayed responses.

### The Significance of the Delayed Response.

K. D. Fairley[1] found a delayed response in twenty-five patients not previously operated on for hydatid disease and of these four were apparently fallacious reactions. Two were due to sensitization following the injection of hydatid fluid at a previous test. The other two were not available for investigation regarding the possible presence of other helminths or of sensitization to host protein.

If the suggested controls are used, a delayed reaction to the first intradermal test will correctly indicate the presence of hydatid disease in more than 90% of patients not previously operated on for this complaint who show this reaction. But in such pre-operative cases K. D. Fairley[1] found a delayed response in only 56% of patients with uncomplicated cysts and in 26% of those with suppurating or ruptured cysts. A failure to react with the delayed phase of this test is thus of no value in excluding hydatid disease.

In post-operative cases of hydatid disease, the delayed reaction is of little value, though a positive response more than ten years after the last operation for hydatid disease is suggestive of the presence of further cysts.

### Conclusions.

1. It is the failure to react and not the immediate reaction which is of chief clinical importance in the intradermal test for hydatid disease.

2. The antigen used in the test must be standardized by being used on a series of patients with no evidence of hydatid or other worm infestation and also on a patient known to show both phases of the response with a suitable hydatid antigen.

3. The injection is preferably made in the skin of the outer aspect of the upper arm. If the patient has previously been subjected to this test, it is

essential to give the injection in an area of skin far removed from the site of the former test.

4. The dimensions of the wheal in the immediate response and of the area of infiltration in the delayed response should always be measured. Standard measurements are suggested for positive and doubtful results and absence of results in this test.

5. An immediate response is of no significance in any patient who yields a triple response to the stroke test or who gives a positive or doubtful response to the control injection of normal saline solution.

6. When an immediate or delayed reaction is obtained in a patient whose responses to the stroke test and the injection of saline solution show that he is a suitable subject for the test, the reaction cannot be interpreted as a genuine one until sensitization to host protein which may have been present in the antigen used and also the presence of other helminths have been excluded.

7. Other conditions such as syphilis, asthma, urticaria and pruritus may occasionally lead to fallacious positive results, but the incidence of these reactions will certainly be diminished by the use of the suggested standards for reactions.

8. In our opinion many of the fallacious positive results obtained in the past will be avoided by standardization of the antigen and by the exclusion of sensitization to host protein, but especially by the use of the stroke test, the exclusion of infestation with other helminths and the adoption of more exacting standards for a reaction.

ACKNOWLEDGEMENTS.

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REFERENCES.

(1) K. D. Fairley: "The Intradermal Test in Hydatid Disease: A Critical Analysis of Its Results," THE MEDICAL JOURNAL OF AUSTRALIA, April 13, 1929, page 472.

(2) F. Graetz: "*Sind die bei Punktionen oder Rupturen von Hydatidencysten auftretenden Schockzustände als Anaphylaxie zu deuten? (Eine experimentelle kritische Studie zur Biologie der Echinokokkeninfektion),*" *Zeitschrift für Immunitätsforschung und Experimentelle Therapie*, 1912, *Band* XV, *Seite* 60.

(3) J. Van der Holden: "*Der Echinokokkenantigen und der Eiweiskehalt der Echinokokkenflüssigkeit,*" *Münchener Medizinische Wochenschrift*, January 18, 1924, *Seite* 77.

(4) C. H. Kellaway: "Hydatid Fluid as an Anaphylactic Antigen," *The Journal of Pathology and Bacteriology*, April, 1928, page 141.

(5) C. H. Kellaway: "The Utility of the Casoni Reaction in the Diagnosis of Hydatid Disease," THE MEDICAL JOURNAL OF AUSTRALIA, April 25, 1925, page 417.

(6) L. Guisti and E. Hug: "*Propriétés Pharmacodynamiques du Liquide Hydatique,*" *Comptes Rendus de la Société de Biologie, Fevrier* 10, 1923, *page* 344. (*Société de Biologie de Buenos Aires, Séances, Octobre* 2 *à* 6, 1922.)

(7) L. Bryce, C. H. Kellaway and F. E. Williams: "A Study of Hydatid Antigen," *The Australian Journal of Experimental Biology and Medical Science*, 1924, Volume I, page 77.

(8) C. Prausnitz and H. Küstner: "*Studien über die Überempfindlichkeit,*" *Centralblatt für Bakteriologie, Parisitenkunde und Infektionskrankteiten*, 1921, *Band* LXXXVI, *Seite* 160.

(9) J. H. Botteri: "*Über Echinokokken-Anaphylaxie,*" *Zeitschrift für die Gesamte Experimentelle Medizin*, 1922, *Band* XXX, *Seite* 199.

(10) F. M. Rackemann and A. H. Stevens: "Skin Tests to Extracts of Echinococcus and Ascaris," *The Journal of Immunology*, June, 1927, page 389.

(11) H. G. Mogena: "*La Intradermoreaction Hidatica,*" *Archives de Medicina, Cirugia y Especialidades, Abril* 17, 1926, Volume XXIII, *Número* 3, abstracted in *Bulletin de l'Institut Pasteur, Juillet* 31, 1926, *page* 622.

(12) P. Escudero, A. Escudero and G. Peco: "*Sobre el Valor de la Intradermo-Reacción Hidatidica,*" *Semana Médica*, September 2, 1926, page 585, abstracted in *The Tropical Diseases Bulletin*, July, 1927, page 522.

(13) F. Fülleborn: "*Spezifische Kutanreaktion bei Infektion mit Strongyloides und anderen Helminthen,*" *Archiv für Schiffs-und Tropen-Hygiene, Pathologie und Therapie Exotischer Krankheiten*, 1926, *Band* XXX, *Seite* 732.

(14) N. H. Fairley: "Researches on the Complement Fixation Reaction in Hydatid Disease," *Quarterly Journal of Medicine*, April, 1922, page 244.

(15) F. Fülleborn: "*Über diagnostische Cutanreaktionen bei Helminthenkrankheiten,*" *Klinische Wochenschrift, April* 22, 1928, *Seite* 820.

(16) K. Steinert: "*Zur Serodiagnostik der Echinokokkuskrankheit beim Menschen,*" *Münchener Medizinische Wochenschrift, März* 2, 1928, *Seite* 389.

(17) G. Lemaire and J. Thiodet: "*Resultats Comparés des Différentes Méthodes Biologiques de Diagnostic des Kystes Hydatiques; Réaction de Casoni,*" *Archives de l'Institut Pasteur d'Algérie, Mars*, 1926, *page* 71.

(18) G. Deusch: "*Zur spezifischen Diagnostik der menschlichen Echinokokkenerkrankungen, insbesondere mittels der Intrakutanreaktion,*" *Deutsche Medizinische Wochenschrift, August* 7, 1925, *Seite* 1319.

(19) N. H. Fairley and F. E. Williams: "A Preliminary Report on an Intradermal Reaction in Schistosomiasis," THE MEDICAL JOURNAL OF AUSTRALIA, December 10, 1927, page 812.

(20) N. H. Fairley: "The Discovery of a Specific Complement Fixation Test for Bilharziasis and its Practical Application to Clinical Medicine," *Journal of the Royal Army Medical Corps*, June, 1919, page 449.

(21) N. H. Fairley: "The Serological Diagnosis of Schistosomum Spindalis; Cercarial Antigen," *Archiv für Schiffs-und Tropen Hygiene, Pathologie und Therapie Exotischer Krankheiten*, 1926, *Band* XXX, *Seite* 372; also *Transactions of Indian Science Congress*, 1923, Asiatic Society of Bengal publication.

(22) J. Parisot and P. Simonin: "*Recherches sur l'Anaphylaxie au Liquide Hydatique,*" *Comptes Rendus de la Société de Biologie, lè* 10 *Fevrier*, 1920, *page* 151.

(23) S. G. Ramsdell: "A Note on the Skin Reaction in Taenia Infestation," *Journal of Parasitology*, December, 1927, Volume XIV, page 102.

(24) H. R. Dew, C. H. Kellaway and F. E. Williams: "The Intradermal Reaction in Hydatid Disease and its Clinical Value," THE MEDICAL JOURNAL OF AUSTRALIA, May 9, 1925, page 471.

(25) C. H. Kellaway: "Diagnostic Tests in Hydatid Disease," THE MEDICAL JOURNAL OF AUSTRALIA, Supplement, November 19, 1927, page 388.

(26) C. E. Hercus: "Laboratory Aids in the Diagnosis of Hydatid Disease," *New Zealand Medical Journal*, December, 1926, page 323.

(27) T. Lewis: "The Blood Vessels of the Human Skin and Their Responses," 1927, London.

(28) H. R. Dew: "Hydatid Disease," 1928, Sydney.

(29) R. Hallam: "Remarks on Urticaria: Its Pathogenesis and Ætiology," *The British Medical Journal*, November 17, 1928, page 879.

(30) K. E. Harris, T. Lewis and J. M. Vaughan: "Hæmoglobinuria and Urticaria Arising from Cold: A Note on the Presence of a Dermolysin," *The British Medical Journal*, November 17, 1928, page 885.

(31) E. Serigós: "*Nuevo Procedimento que Permite Obtener Reacciones más Sensibles; Possibilidad de Descubrir Quistes Hidáticos de Difícil Diagnóstico,*" *Semana Médica, Novembro* 18, 1926, *página* 1374, abstracted in the *Tropical Diseases Bulletin*, July, 1927, page 522.

# THE USE OF GRENZ OR BUCKY RAYS IN DERMATOLOGY.

By HERMAN LAWRENCE, M.R.C.P. (Edinburgh),
*Honorary Consulting Dermatologist to Saint Vincent's and Queen Victoria Hospitals, Melbourne,*

AND

ROBERT BRODIE, M.B., B.S. (Melbourne), F.R.C.S. (Edinburgh),
*Honorary Assistant Dermatologist to the Alfred Hospital, Melbourne, and Honorary Consulting Dermatologist to the Victorian Eye and Ear Hospital, Melbourne.*

GRENZ RAYS (German for border line or frontier) is the term applied by Bucky[1] to the electromagnetic oscillations produced by a special form of apparatus designed by him. Bucky has applied this term *Grenz* because he considers the oscillations to lie between those of the X rays and the ultra-violet rays. The *Grenz* rays are heterogeneous, but the majority of the rays is of the order of two Ångström units. The minimum wave length is 1·6 Ångström units. The wave length of two Ångström units is very close to the wave lengths of X rays which are used therapeutically (0·1 to 1·6 Ångström units), but far from the wave lengths of the ultra-violet rays (1,000 to 4,100 Ångström units).[2]

Some eight years ago Bucky commenced the study of the properties of the wave band of two Ångström units. He considered that it was probable that the radiation effects of the *Grenz* rays would resemble in some respects those of the X rays and in others those of the ultra-violet rays. This supposition has proved correct. Bucky has developed a special form of tube for the production of *Grenz* rays and a modified transformer to activate it. Figure I is a diagramatic sketch of the tube modified from MacKee.[3] Figure II is a photograph of an actual tube and its adjuncts.

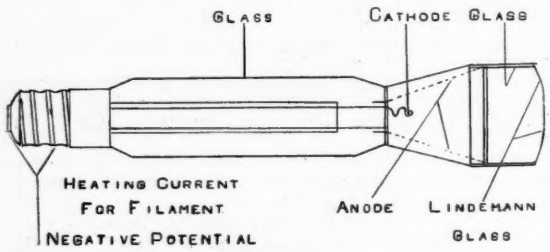


FIGURE I.
Diagrammatic Sketch of a *Grenz* Ray Tube. (Modified from MacKee.[3])

The tube is manufactured in Germany. It is cylindrical in shape and formed mainly of glass and is contained in a tube holder which is universally jointed. At one end is attached a screw connexion for attachment to the current supply cable from the transformer. At the other end the last six centimetres of the tube are formed by a conical anode made of chromium iron. At the axis of the anode a cathode of the hot filament type is fixed. The wider end of the anode is closed by a window of special glass composed of lithium borate and known as Lindemann glass. This glass is a very important part of the apparatus, as it permits the passage of rays of a wave length longer than does ordinary glass. The tube is unipolar, the positive side of the transformer being earthed. A detachable water jacket is fitted around the anode to conduct away the heat generated. The water jacket may be operated either from an ordinary tap or by means of a small electric pump and a reservoir of water. The tube is activated by a modification of the usual interrupterless X ray transformer designed to give a maximum peak voltage of ten kilovolts and a maximum high tension current of ten milliampères. The transformer is contained in a movable cabinet on top of which are placed a volt meter and a milliampère meter and which contains in addition to the high tension transformer a step-down transformer for the supply of current to the filament of the cathode. An upright post on the back of the cabinet acts as a support for the tube holder. The controls are three in number and consist of (i) a starting and cutting-out switch, (ii) a graduated voltage control, (iii) a graduated milliampèrage control.

The apparatus differs essentially from an ordinary X ray apparatus in the low voltage supplied to a hot cathode tube fitted with a window of Lindemann glass which permits the passage of rays of the order of two Ångström units.

### Dosage.

In all our work we have made use of the erythema unit described by Eller.[4] The erythema unit may be defined as that dose of *Grenz* rays which, when applied to the flexor surface of the forearm of a young brunette adult, produces a mild red blush between twelve and twenty hours after exposure. The voltage has always been maintained at eight kilovolts and the milliampèrage at eight milliampères.

With our particular apparatus the erythema unit has been found by experiment to be given by the following factors: Voltage, eight kilovolts; milliampèrage, eight milliampères; distance, six centimetres (calculated from the centre of the conical anode); time, four and one-half minutes.

The erythema so produced lasts for varying periods from five to sixten days and is followed by pigmentation. All our dosages have been unit doses or multiples of this unit. Repetition of dosage has been practised after one week following unit doses and after fourteen days following two or three unit doses.

### Clinical Effects.

The reaction following on unit doses resembles that of a mild reaction from ultra-violet rays. Pain is absent or only very slight, but the pigmentation resulting persists for periods varying from six weeks to seven months. We have noticed only one delayed secondary reaction. This occurred on the forearm of one of us (R.B.) on an area which had been sub-

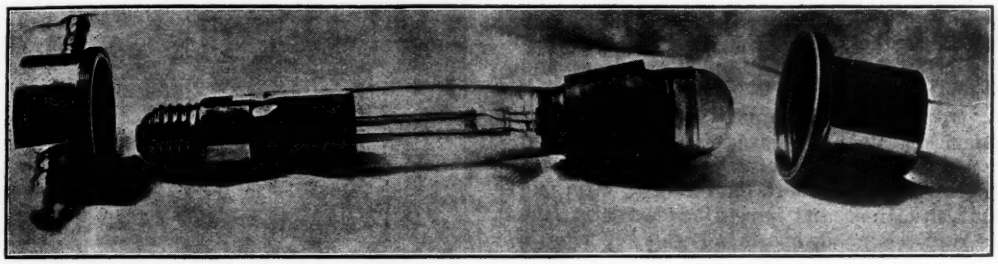

FIGURE II.
Photograph of an actual *Grenz* ray tube and its adjuncts.

mitted to a unit dose, the reaction from which had subsided in seven days, but on which pigmentation was still pronounced. This secondary reaction was associated with the formation of vesicles of pin point size which desquamated; there was considerable pain which lasted for about a fortnight.

Two unit doses are followed by vesiculation and fine desquamation and are slightly painful.

Three unit doses are followed by considerable vesiculation and desquamation. We have not used dosage in excess of three units.

No epilation of hair has been seen even after a total of ten unit doses.

The ocular conjunctiva and the cornea appear to be particularly resistant to this therapy, as not the slightest visible or noticeable reaction has occurred on them, when they were exposed to multiple unit doses during the course of treatment of rodent ulcers involving the eyelids. We think that this observation is of the greatest value in the treatment of lesions in proximity to the eyes. To date no cases of atrophy or of telangiectases have been noted by ourselves or reported by other observers.

It is generally admitted that patients who have been treated by Bucky's method, are keeping free of the disfiguring sequelæ so often seen in patients who have been treated with X rays. These untoward results include telangiectases, atrophy of the skin, keratoses, late ulcerations, precancerous and even malignant conditions, also hyalinization of the skin with intractable pruritus and dermalgic pains.

Quite recently a patient came under our care suffering from intractable irritation and pain in a patch of chronic X ray dermatitis. The condition eventually required excision and skin grafting. For the above reasons alone *Grenz* rays should be considered in patients suitable for their application in preference to X rays.

The following table, modified from one appearing in the article by Bucky and Ellers,[1] shows a comparison of the symptoms produced by *Grenz* rays, X rays and ultra-violet rays.

According to Bucky and Eller,[1] when *Grenz* rays are allowed to strike the skin, 50% of the incoming radiation is absorbed in the first 0·4 millimetre of the skin. At 0·8 millimetre, that is the level of the sebaceous glands, there remains only 25% of the original radiation and at the level of the most superficial hair follicles, that is at 2·2 millimetres, only 1% remain. This lack of penetration is highly desirable in the treatment of many dermatoses.

| Symptoms. | | Ultra-Violet Rays. | *Grenz* Rays. | X Rays. |
|---|---|---|---|---|
| Erythema | Latent period | Several minutes or hours | Several minutes or hours | Several days to three weeks |
| | Duration | One week | One to two weeks | Some weeks |
| Bullæ | | Yes | Yes | Yes |
| Ulceration | | No | No | Yes |
| Epilation | | No | No | Yes |
| Pigmentation | | Yes | Yes | Yes |
| Telangiectasis | | No | No | Yes |
| Atrophy | | No | No | Yes |
| Scaling | | Yes | Yes | No |
| Restitution | | Good | Good | Bad |

Before the introduction of the Coolidge tube one of us (H.L.) used X ray tubes with Lindemann glass windows in dermatological practice. Using a coil apparatus, a reaction could be quickly produced and much time saved in the treatment of suitable conditions. However, the radiations produced by these tubes differed from the *Grenz* rays in that there were also present a large percentage of more deeply penetrating rays, probably due to the higher voltage employed. This no doubt accounted for the telangiectases which were prone to occur and which forced the eventual abandonment of the use of these tubes.

### Clinical Results.

During the course of the last seven months we have treated a total of fifty-two patients by means of the *Grenz* rays. Sixteen differing types of dermatoses were treated. We realize that it is early to dogmatize on the results achieved and from the small number treated, but we believe that *Grenz* rays are in some conditions an improved method of treatment and that the safety factor is greater than with X rays.

#### *Rodent Ulcer.*

Twelve patients with rodent ulcer have been or are under treatment. Of the ulcers eight involved the lower eyelid. Four patients are apparently

cured with an excellent cosmetic result and at no time was there the slightest sign of any conjunctivitis. One ulcer responded for three doses and then became resistant and the patient is at present receiving treatment with radium. Three patients are still under treatment, but are responding so well that we are very hopeful of a good result in all. The remaining four patients had rodent ulcers in indifferent situations and have all cleared up; the cosmetic result is good, but in no way superior to that obtained by either radium or X rays and took considerably longer to obtain. We are of the opinion that the *Grenz* rays are the method of choice in the treatment of rodent ulcers involving or near to the eyelids, but that rodent ulcers in other situations are more efficiently treated by other means. It at first sight seems strange that a ray whose penetrative power is slight, should be able to effect a cure on relatively deep seated lesions. MacKee and Pusey in a discussion following on the reading of Bucky and Eller's paper,[1] suggested that this is due to the destruction of the growth layer by layer. We have employed doses of two and three units respectively and repeated in fourteen days for four or five times. During the last twenty-four years one of us (H.L.) has treated a large number of patients with rodent ulcers of the eyelid by means of both radium and X rays. The results

FIGURE III.
Shows a patient with rodent ulcer of the left lower eyelid before treatment with *Grenz* rays.

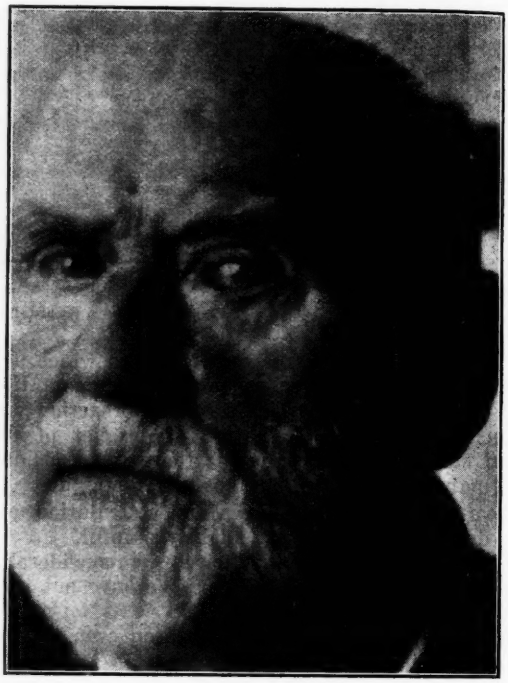

FIGURE IV.
Shows the same patient after five treatments with two unit doses.

on the whole have been favourable. Unfortunately by these methods the eyelashes were often permanently epilated and some patients complained subsequently of occasional attacks of conjunctivitis, apparently due to the loss of the protecting action of the eyelashes against the entrance of foreign bodies into the conjunctival sac. In patients whom we have had under treatment for rodent ulcers of the eyelids with *Grenz* rays, the eyelashes have remained intact when they were not already lost.

Figure III shows a case of rodent ulcer of the left lower eyelid before treatment with *Grenz* rays. Figure IV shows the same patient after five treatments with two-unit doses.

*Epithelioma.*

Only two patients with epithelioma have been treated; both growths were on the dorsum of the hand. One made slight improvement, the other no improvement at all. Both are now clearing up with radium therapy.

*Keratoses.*

Five patients with multiple keratoses have been treated. All these have at various times received either radium or X rays. All the lesions treated with *Grenz* rays have done well. The dosage required has been between four and five units.

*Psoriasis.*

Two patients with psoriasis only were treated; both had isolated and thickened patches; in spite

of several multiple unit doses neither patch cleared up and we have decided not to persist further.

*Perleche.*

One patient with perleche has been treated and the condition cleared up after three doses, each of one unit.

*Hydrocystoma.*

One patient with hydrocystoma has been treated without up to date any improvement.

*Erythema Induratum.*

One patient with *erythema induratum* was treated without benefit.

*Granuloma Pyogenicum.*

One patient with *granuloma pyogenicum* was treated and the condition cleared up after two doses, each of one unit.

*Verruca.*

One patient with verruca of a very thickened type was treated, but without benefit.

*Pruritus Ani et Vulvæ.*

Three patients with *pruritus ani et vulvæ* have been treated, all with great benefit and up to date have not relapsed. Two doses, each of one unit, were given.

*Rosacea.*

One patient with rosacea who had previously been found hypersensitive to X rays, was treated, but the hypersensitivity was present to one unit dose of *Grenz* rays, so the attempt was abandoned.

*Alopecia Areata.*

Two patients with *alopecia areata* which had been resistant to treatment with ultra-violet rays, were treated with two-unit doses on three occasions in the hope that the reaction produced would be a stimulant. In neither case was any benefit obtained.

*Dermatitis.*

Four patients with dermatitis have been treated with unit doses and in all the condition has cleared up. In this disease the small area which can be covered in one field is a great drawback.

*Seborrhœa.*

Five patients with seborrhœa have been treated, all with good effect. One unit doses were used. The same comment about the area covered in one field applies here as in dermatitis.

*Lupus Erythematosus.*

Eleven patients with *lupus erythematosus* have been treated. Of these five have shown no improvement; all had chronic types of the condition with much thickening. Three with the moderately severe type have shown improvement. Unit doses have been given from four to six times. Three have shown great improvement. The condition in two of these was in an early stage and has apparently cleared up as the result of three doses, each of one unit. The other patient was one showing three thickened patches on the cheeks and nose which have almost cleared up as the result of five doses, each of one unit.

In a patient with chronic X ray dermatitis a patch of pyodermia with keratoses was treated with *Grenz* rays. A reaction occurred and was followed by exfoliation of the part treated which then appeared normal. An interesting point in this case was that on examination of the hand with the illumination produced by passing ultra-violet rays through Wood's glass the opalescent spots which had previously been present indicating the position of keratoses, had completely disappeared in the area treated with *Grenz* rays.

### Conclusion.

We consider that the *Grenz* rays have effects which separate them from either X rays or ultra-violet rays. The results in many dermatoses are equal to those obtained with X rays and with less risk of possible after sequelæ. For the treatment of rodent ulcers near the eye they are the method of choice.

### Acknowledgement.

We should like to acknowledge our indebtedness for much of the matter of the first part of this article which has been derived from the article of Eller and Bucky.[1]

### References.

(1) Joseph J. Eller and Gustav Bucky: "The Use of Grenz (Infra-Roentgen) Rays in Dermatologic Conditions," *Archives of Dermatology and Syphilology*, February, 1928, page 231.

(2) E. H. Russell and W. K. Russell: "Ultra-Violet Radiation and Actinotherapy," 1925, page 39.

(3) George M. MacKee: "X Rays and Radium in the Treatment of Diseases of the Skin," 1927, pages 424 to 427 and 749 to 759.

(4) Joseph J. Eller: "Supersoft Roentgen Rays (2A) in Dermatology," *The American Journal of Roentgenology and Radium Therapy*, November, 1927, page 440.

## Reviews.

### DENTAL SCIENCE AND MEDICINE.

THAT there is urgent need for a system of dental science as distinct from dental surgery to cope with the diseases of the teeth and their supporting structures is the theme of a thesis by F. W. Broderick in "Dental Medicine."[1] He is of the opinion that the problems underlying the cause of dental caries and *pyorrhœa alveolaris* will be found and solved, not by a consideration of the local conditions only, but by a consideration of the predisposing causes which are dependent upon and are the result of a disordered metabolism.

Part I of the book, which is divided into two sections, deals with the ætiology and preventive treatment of dental caries and *pyorrhœa alveolaris*. In this part the author

[1] "Dental Medicine," by F. W. Broderick, M.R.C.S., L.R.C.P., L.D.S. (England); 1928. London: William Heinemann (Medical Books) Limited. Demy 8vo., pp. 380. Price: 21s. net.

attempts to prove that the predisposing cause of both the conditions is an alteration or a tendency to an alteration of the acid base balance of the blood to the acid side in dental caries and to the alkaline side in *pyorrhœa alveolaris*.

Part II deals with the relation of dental to general medicine. Here the author sets out to prove that the essential causes that lie behind both these dental conditions, have been brought about by man's failure to adapt himself to environmental circumstances under which civilization compels him to live. These may be physical, mental or dietetic. One result of this failure of man's adaptation has been to throw too great a strain upon his endocrine system, with the result that the delicate interaction of its various parts has been disturbed and as a consequence its functional activity is upset.

With regard to the relationship of dental sepsis and the rheumatic disturbances, he is of the opinion that it is not a case of cause and effect, but that focal infections and metabolic disturbances may both be the result of the one and same functional upset. Both the dental caries in the first place, followed by the inability to quarantine fully the infection directly resulting therefrom, are the result of an endocrine derangement which is also responsible for the rheumatic diathesis. The essential feature in these conditions is a functional upset in the vegetative nervous system and the sympathetic parasympathetic balance.

It is improbable that the views expressed will meet with universal approval, for there is much that is new. The book stands as a signpost which shows the path along which dental research will advance in the future. The problems of dental research are the problems of the bio-chemist.

This is a book which should be in the library of every progressive dentist and medical practitioner. Its perusal will widen the outlook of both on the question of dental caries and its careful study will be well worth the effort required.

## ANTE-NATAL SUPERVISION.

ANTE-NATAL care, recently described as the very essence of intelligent midwifery, has become of such importance that a book by Dr. W. F. T. Haultain and Dr. E. C. Fahmy has been published. It comes from Edinburgh, the school of its introducer, the late J. W. Ballantyne; consequently it gives an account of the Edinburgh Ante-natal Clinic and covers twelve chapters, one hundred pages in all.

The authors describe all the working arrangements and even the case cards; they give a diagram of the department and a photograph of the examination room. They wisely suggest that ante-natal care should commence as soon as the first period is missed. It is pointed out in the chapter on measurements of the pelvis that the diagonal conjugate should not be taken till the last possible moment of frequency, that is four to six weeks before term, the tissues becoming softer during pregnancy and the nearer to full term, the softer they are; this advice is most important in a *primipara*. The pelvis of a *primipara* should always be measured, but it is not always necessary in a *multipara*.

A lot of detail is given in the treatment of eclampsia and *ante partum* hæmorrhage for a small book on ante-natal care. There is a chapter on pain in pregnancy; pain is often difficult to account for and is seldom found described in other books. Another useful chapter and the final one is on venereal diseases.

To the general practitioner, the student and those wishing to establish an ante-natal clinic the book will be useful and will serve the purpose for which it has been intended. The teaching of the book is sound, as would be expected, since the book comes from such a school and the writers are to be congratulated on what is probably the first book of its kind to be published.

[1] "Ante-natal Care: A Practical Handbook of Ante-natal Care and of the Abnormalities Associated with Pregnancy," by W. F. T. Haultain, O.B.E., M.C., B.A., M.B. (Camb.), F.R.C.S.E., and E. Chalmers Fahmy, M.B. (Edin.), F.R.C.S.E., with Foreword by Professor R. W. Johnstone, C.B.E., M.A., M.D., F.R.C.S.E.; 1929. Edinburgh: E. and S. Livingstone. Crown 8vo., pp. 125. Price: 5s. net.

## HALLIBURTON'S PHYSIOLOGY.

THE handbook familiar to our youth as "Halliburton" has now entered upon a new phase of its existence. In the latest (eighteenth) edition Professor Halliburton has collaborated with Professor McDowall, his successor in the chair of physiology at King's College.[1]

This evergreen publication which has a history dating back to the 'forties of last century, loses none of its usefulness with the passage of years. The present edition retains the form of its predecessors. A certain amount of rearrangement of the sections has taken place. The result of this is an increase of lucidity in the presentation of the subject matter. In several of the sections a good deal of alteration has been made and some very recent work has been incorporated in them. An example of this is the discussion of Mellanby's work of the last year or so on the relation between the bile salts and the pancreatic secretion.

Although new sections have been added on certain physico-chemical matters of physiological importance, such as the regulation of the acidity of body fluids, the bio-chemical sections in general seem a little less adequate than other parts of the work. However, the task of discussing the more important facts of so vast a subject as physiology within the limits of the volume has been dealt with in a remarkably successful way. The number of pages and, incidentally, the price of the volume have been slightly reduced.

It seems likely that this book will remain a boon to medical students for many years to come.

## ZINC IONIZATION IN CHRONIC OTORRHŒA.

"NOTES ON CHRONIC OTORRHŒA," by A. R. Friel, belies its unassuming title, for here are more than mere notes.[2] The book is an excellent monograph mainly concerned with the therapeutic application of zinc ionization in chronic otorrhœa. In the modest compass of some eighty pages the author first deals with the relevant facts of physics, chemistry, anatomy and pathology and then proceeds to weave these facts into a logical account of the clinical use of the zinc ion.

He postulates that zinc ionization is not to be considered as a cure for chronic otorrhœa, but rather as a successful means of eradicating the causal areas of sepsis from the ear. Hence he insists upon exact localization of the infection followed by such a technique as will insure that the curative ion positively reaches the infective area. In this connexion there is a nice correlation between the particular method of application and the particular pathology present—a precision only too rare in writings on physical therapy.

Dr. Friel has obviously written with the general practitioner in mind, so that there is a wealth of lucid information embracing all the necessary detail to carry out this procedure. The book concludes with a triumphant series of statistics based upon a careful standard of cure, a short bibliography and an account of the organization of a clinic to treat a large number of patients.

Those who have tried zinc ionization and failed to obtain convincing results, will probably find in this little work just where their failure lies.

[1] "Handbook of Physiology," by W. D. Halliburton, M.D., LL.D., F.R.C.P., F.R.S., and R. J. S. McDowall, M.B., D.Sc., F.R.C.P. (Edinburgh); Eighteenth Edition; 1928. London: John Murray. Demy 8vo., pp. 924 with illustrations. Price: 18s. net.

[2] "Notes on Chronic Otorrhœa with Special Reference to the Use of Zinc Ionization in the Treatment of Selected Cases," by A. R. Friel, M.A., M.D. (Univ. Dublin), F.R.C.S.I.; 1929. Bristol: John Wright and Sons, Limited. Demy 8vo., pp. 95, with illustrations. Price: 6s. net.

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## The Herbalist and the Patent Medicine Vendor.

The patent medicine trade exists and flourishes as a result of advertisement. Some newspapers are prepared to accept and publish advertisements of any charlatan who is willing to pay for the space occupied. It is true that the reputable section of the daily press refuses the thinly cloaked recommendations of pills and potions for the procuring of abortion and of alleged aphrodisiacs. A feeble pretence is made by some to exercise control over the nature of the medicinal advertisements inserted. That a strict censorship is nowhere in practice is evident from the wording and illustrations of the advertisements that appear in every daily newspaper in the Commonwealth. The patent medicine manufacturer and vendor make large fortunes and can afford to pay well for advertisement. The newspapers are naturally reluctant to forgo this substantial income. The public is swayed by clever slogans, supported by the testimony of foolish people in regard to the imagined benefit derived from the taking of the remedies. At times the testimonials are written in an office; at times they are bought by the manufacturer. But whether they are genuine but mistaken expression of opinions, frank frauds or trade swindles, they are always worthless and harmful to the public. There is, it is true, a vast difference between the relatively harmless preparation for which impossible claims are made and preparations which contain ingredients with powerful pharmacological action. The latter are often extremely dangerous when taken without proper guidance based on physiological knowledge. But even the almost inert medicines must be regarded as inimical to the public good, since the condition from which the person taking the useless preparation is suffering, may advance to an incurable stage before he seeks honest treatment.

The public press is not the only channel of advertisement of the medicine vendor and herbalist. In recent times some astounding nonsense has been broadcast from the regular wireless stations by persons having something to sell, but no knowledge of physiology or pathology. It is incomprehensible that the public can tolerate the boosting of unqualified practice in this way. It is transparent that the owners of the wireless stations and the proprietors of many newspapers are indifferent to the welfare of the people, provided that they can earn more money.

It is frequently stated that the medical profession attacks unqualified practice because it objects to a supposed loss of income. The law has determined that no one may sign certificates required for legal purposes except registered medical practitioners, that certain offices can be filled only by registered medical practitioners and that registered practitioners alone can receive recognition in matters affecting the health of the people. It is a penal offence for anyone to describe himself as a medical practitioner by using the title of doctor or some other designation unless his name has been entered in the medical register in the State in which he practises. Moreover, medical registration is governed by the *Medical Act* in each State. It is therefore reasonable to claim that those who study medicine at the recognized schools and who pass the examinations prescribed for the gaining of degrees or diplomas in medicine, are competent to undertake the care of persons suffering from disease or injury. As a corollary it may be stated that it is dangerous and not in the public interest for a person who has not studied medicine at a recognized school and who has not passed the prescribed examinations, to engage in medical practice. Medical practitioners have a right to protection, but it is by no means certain that self-medication and treatment by unqualified persons reduce the earnings of medical practitioners. Be this as it may, the public should be protected against the harm that can be and is done by irregular practitioners.

In a previous article on the subject of unqualified practice published a short time ago, we stated that it is doubtful whether it would be possible to introduce and enforce a measure forbidding medical practice by persons other than registered medical practitioners. In nearly every State of the Commonwealth a heavy penalty can be inflicted on an unregistered person for treating patients suffering from venereal diseases. Perhaps the authorities will render it an indictable offence for anyone other than a registered medical practitioner to treat patients with cancer. It is, however, improbable that the legislature would extend this provision to include treatment of persons suffering from all forms of disease. It is necessary to protect people against their own folly. Many folk fly to the herbalist and vendor of patent medicines because they believe all the humbug these charlatans foist on the credulous. The obvious remedy is to demand a statutory prohibition of all advertisements containing claims that patent or proprietary preparations can cure any disease or are endowed with special virtues beyond those known to be possessed by the ingredients. It should further be necessary for every manufacturer or vendor of these preparations to publish on the label the exact composition of the preparations and the place of manufacture. A heavy penalty should be inflicted if the published formula proves to be incorrect. All statements to the effect that the method of compounding or the peculiar combination of ingredients lends to the preparation some mysterious or unsuspected action should be disallowed, as should all other unfounded, exaggerated or misleading statements. There should be a strict censorship over the advertisements of nostrums, herbal preparations and other medicines, not only in newspapers, magazines and periodicals, but also in handbills, dodgers and circulars. It should be the function of a special board to sanction each advertisement offered to the press. The vaunting of any remedy or method of treatment of disease by broadcasting should be prohibited in all circumstances. Our public health departments have the custody of the welfare of the people and they should not continue to allow money-making quacks to amass fortunes to the detriment of the public health.

# Current Comment.

## PEPTIC ULCER.

A GREAT deal has been written about the treatment of peptic ulcer. Medical and surgical forms of treatment have been compared and advocates for each have pushed their claims. It is only when a large number of patients has been treated, when the condition of the patient has been carefully noted, when treatment has been carefully controlled and when the results of treatment are followed over a considerable period that it is justifiable to draw definite conclusions. Study of this kind entails considerable labour and many investigators are not prepared to take the necessary trouble to produce results. Frequently workers who undertake the search of hospital records, find that the latter have been so badly kept that it is well nigh impossible to discover the necessary facts.

A useful and important study has recently been made at the Peter Bent Brigham Hospital by E. S. Emery and R. T. Monroe.[1] Their findings are of great interest and well repay consideration. The patients reviewed by them comprise all those with gastric and duodenal ulcer who were admitted to the institution from its opening in 1913 to September, 1926. Twenty-five patients whose condition was diagnosed as peptic ulcer, were omitted because the symptoms and X ray findings were such as to raise a reasonable doubt as to the accuracy of the diagnosis. The whole series consisted of 556 patients. Of those 407 were admitted to the medical wards, 149 were admitted directly to the surgical wards and 155 were transferred from the medical to the surgical wards for operation. It is to be presumed that a certain number of the 149 admitted directly to the surgical wards had undergone medical treatment before surgical measures were determined upon. It is recognized that the economic position of the patient as well as the desire of the surgeon has a great deal to do with the primary choice of surgical measures. If it were not so, the number 149 would have to be adjudged too high. That surgical measures are not undertaken precipitately at the Peter Bent Brigham Hospital is shown by the transference of 155 patients from medical to surgical wards. It was found possible to follow 460 patients or 82·5% of the total. Of the total 13·6% are dead from various causes, 47·4% have been followed from their discharge to the present time, 21·5% have been heard from since discharge, but not recently and 17·5% have not reported. The duration of observation varied from six months to thirteen years, the average was four years. For patients treated medically the average was two and a half years and for those operated upon it was slightly more than four years.

The condition of the patients after treatment was classified into three groups: good, improved and unimproved. There was still a further subdivision

[1] *Archives of Internal Medicine*, June, 1929.

into those patients who were satisfied and those who were not satisfied with the treatment. A patient was regarded as belonging to the "good" group if since the conclusion of treatment he had experienced no discomfort of any kind, either from the ulcer or from the treatment itself. Patients in the "improved" group suffered at times from symptoms of ulcer, but for one cause or other were better for having been treated. The "unimproved" group was that of those who at the time of observation were obviously no better than before they underwent treatment. If the results of all forms of treatment are considered, it is found that of 519 patients 37·8% were in the "good and satisfied" group, 16·3% were improved and satisfied, 5·3% were improved and not satisfied and 40·6% were unimproved and not satisfied. The number of patients who had medical treatment and who had not been previously subjected to a surgical operation, was 186; of these 29·8% had a result which was good and the patients were satisfied, 20% were improved and satisfied, 1·5% were improved and not satisfied and 48·7% were unimproved and not satisfied. The number of patients subjected to surgical treatment who did not have perforation, was 248; the percentages among the four groups just mentioned were respectively 44·8, 9·2, 5·6 and 40·6. The interesting and humiliating point about the results is that those persons who received no treatment at all, had results that were nearly as good as those of the treated persons. The untreated persons were 43 in number; ten of them or 23·2% had a good result and were satisfied, 11 or 25·6% were improved and satisfied and those who were unimproved and not satisfied, numbered 22 or 51·1%. The last figure is not much higher than that of the medically treated who were unimproved and not satisfied. Reference will be made to this group later on.

The reasons for the failure of treatment are set out in a table. Failure among those treated by medical means was due to persistent pain in 53 instances, to hæmorrhage in 24, to obstruction in eight and to "dissatisfaction" in five. Three patients treated medically or 1·3% of this group died. Among those treated by surgical means treatment failed in 37 instances on account of pain, 20 suffered from hæmorrhage, 14 from obstruction, six suffered from jejunal ulcer, four from fistula and nineteen died. In addition to this number seven died of ulcer later on and two died after operations for the repair of gastro-jejuno-colic fistulæ. Although the statement is made that surgical methods were in general more effective than medical methods, this is qualified by the statement that the better results were "somewhat offset" by the more disastrous consequences when surgical measures failed. Enough emphasis has not been placed upon this. Exclusive of those who died after secondary operations, and of those who died later on after operation, the percentage of deaths among the surgically treated was 6·9 or more than five times the percentage of deaths among the medically treated. The severity of symptoms manifested by patients admitted to hospital must be considered. The patients subjected to operation at an early stage will be taken chiefly from those whose symptoms are severe. The patients transferred from medical to surgical wards for operation will comprise many whose symptoms have shown no signs of abatement. Those who continuously refuse treatment will be chiefly persons whose discomfort is not very acute. It is thus natural to expect a somewhat higher death rate and a larger proportion of those who are not satisfied among those treated by surgical means.

The whole article by Emery and Monroe is full of good material and should be carefully studied by both surgeon and physician. We place the latter first because he is as a rule more satisfied with his achievements than the physician. The general conclusion which must be reached, will undoubtedly coincide with that formed by them. It is one on which we have repeatedly laid stress in these columns, namely, that cure can come only when the real nature of the disease is understood and when a method of treatment is devised which strikes at the cause and not at the symptoms. These are days when people who ought to know better, are talking about research by means of treatment. Such statements are a sop to the multitude. If no treatment were adopted to alleviate those persons suffering from peptic ulcer, many more people would continue to live with their symptoms. If all the energy which is expended in treating these people, were used up in endeavouring to determine the cause of ulceration of the stomach and duodenum, the time would come when the percentage of persons retaining their symptoms would be more than compensated for. It is not to be understood that all sufferers from peptic ulcer ought to be left in their gastric misery. This would be inhuman. What is necessary is a readjustment of perspective. The present position is a reproach to the medical profession. The work reported by Emery and Monroe is not the work of two individuals, but represents the combined efforts of the staff of a well equipped and modern hospital. The results are probably representative of many large centres. Emery and Monroe suggest that when patients realize that they are suffering from a chronic illness for which there is no cure, they will become a cooperative group. This is true enough, but the medical profession must show the way by ceasing to talk of cure and by the undertaking of organized research.

## THE DENTAL JOURNAL OF AUSTRALIA.

We are in receipt of the first issue of *The Dental Journal of Australia*. This journal is the outcome of the Sixth Australian Dental Congress held in Melbourne. It replaces the two journals previously existing. We congratulate the Australian Dental Association and the editor and wish the journal success.

# Abstracts from Current Medical Literature.

## MORBID ANATOMY.

### Innervation and Tumour Growth.

H. W. JULIUS (*The British Journal of Experimental Pathology*, April, 1929) states that when tar is painted on the skin of mice, it is found that after an interval of time as short as two weeks the nerves begin to grow out of their normal fascicles towards the epithelium as thin, mostly non-medullated threads. This has been described as hyperneuria. The opposite phenomenon also occurs at the same time and there is a decrease of the normal tendency of the nerves to establish close contact with the cells of the epithelium; this is katatropism. Hyperneuria also occurs as a result of mechanical lesions, such as burning. In view of some work done by Cramer the author has reinvestigated this subject. Cramer cut a piece out of the skin and sewed it into position again and when the graft had taken he painted it with tar. He concluded that loss of nervous control in an area of skin does not predispose to cancer. The author has removed pieces of skin of mice two by one and a half centimetres after the manner of Cramer and has sewn them on again. He did not apply tar. He found that nerve threads are present in the autoplast in less than eighteen days and that complete innervation is reestablished within twenty-five days. Hyperneuria sets in after forty days. Taking these results into consideration together with the effect of tar painting of normal skin, he concludes that Cramer did not apply the tar on a denervated skin area and that his conclusions may need revision.

### Age Incidence of Tumours.

L. L. TUREEN AND LEO LOEB (*The Journal of Cancer Research*, March, 1929) have investigated the age incidence of tumours in mice and its inheritance. They find that tumour rate and tumour age incidence are determined by heredity. They claim to have confirmed the conclusion previously formed by Loeb, that there exists a definite relation between tumour age and tumour rate: the higher the tumour rate, the earlier the tumours appear; the lower the tumour rate, the later they appear. Added to this relationship there is another factor, that of the specificity of the age incidence in certain strains of animals. Thus in certain strains with a low tumour rate there may be an early tumour age and strains with a high tumour rate may be characterized by tumours appearing late. Thus the factors which determine tumour rate, are distinct from those which determine tumour age. In other words those hereditary factors which determine in how many individuals of a certain family tumours shall appear, are distinct from those factors which determine how readily this transformation is accomplished in the individual mouse, having an hereditary tumour tendency. These conclusions are confirmed by the analysis of the inheritance of tumour rate and tumour age in hybrid strains. The tumour age curve has a typical shape. With increasing age the stimuli leading to cancerous transformation can act with increasing frequency and intensity; possibly fibrous changes, occurring late in life, may favour this change. On the other hand the concomitant decrease in metabolic and other activity is unfavourable to growth processes. These factors explain the typical tumour age curve.

### Hæmorrhage in Adenoma of the Thyreoid.

JOHN K. DEEGAN (*The Clifton Medical Bulletin*, April, 1929) states that hæmorrhage into the thyreoid is by no means rare. It is regarded as one of the ætiological factors of cyst of the thyreoid. Severe hæmorrhage is uncommon. A woman, aged thirty-one years, had suffered for eight years from enlargement of the thyreoid. While sitting reading, she became conscious of a sudden swelling of the thyreoid. She experienced a choking sensation and became dyspnœic. Morphine gave relief. Another attack of a similar nature occurred. Partial thyreoidectomy was performed and it was discovered that a hæmorrhage had occurred into the centre of an adenoma. The mass of blood clot measured two by three centimetres.

### Cause of Death in Malignant Disease.

A. A. THIBAUDEAU (*The Journal of Cancer Research*, March, 1929) makes a statistical analysis of the findings at *post mortem* examination on the bodies of 149 males and 112 females who died of malignant disease. Among the conditions found most often were the following: in males, Hodgkin's disease 22%, cancer of the neck 20%, of the œsophagus 20%, of the stomach and intestine 18%, of the prostate 13%, sarcoma 15%; in females, cancer of the uterus 45%, of the breast 25%, of the stomach and intestine 11%. The immediate cause of death was pulmonary embolus in 3%, cachexia in 15%, intestinal obstruction in 2%, meningitis in 2%, œdema of the glottis in 4%, malnutrition in œsophageal carcinoma in 5%, hæmorrhage in 12%, pneumonia in 14% and infection in 43%.

### Skin Regeneration and Cancer.

R. J. LUDFORD (*The British Journal of Experimental Pathology*, June, 1929) has investigated the question as to whether periodical skin scarification of an area of the skin results in aberration of the process of repair and leads to the induction of cancer or furthermore if an area of skin which has been the site of repeated stimuli and repair is more susceptible to the carcinogenetic action of tar than normal skin. The author has found that out of fourteen mice which were painted with tar twenty-seven times and then scarified in the same region of the skin once a week, only two developed carcinomata, while papillomata developed on five others, but ultimately disappeared. He suggests the scarification rubbed away the epidermal cells which had previously been subjected to the action of tar. He also points out that there is a possibility that the sclerosis which results from scarification may be an important factor. He concludes that periodical scarification of an area of skin in the mouse does not result in aberration of the process of repair, nor does it lead to the induction of cancer and that a region of the skin which has been the site of repeated injury and repair, is not more susceptible to the carcinogenetic action of tar than that of the normal skin.

### Congenital Diverticulum of the Stomach.

NEIL SIMPSON (*The British Journal of Surgery*) reports a congenital diverticulum of the stomach. The patient was an infant, four months of age. The symptoms suggested intussusception. At operation a plum coloured, tense swelling was found, attached by a pedicle to the under surface of the mesocolon. The child's condition was so bad that the pedicle could not be traced to its origin. The author publishes a report by Keith, who states that the structure was that of the stomach; there was no open communication with the stomach. Keith thinks that the diverticulum arose from the dorsal border of the stomach during the second month of development, that it was included in the dorsal mesogastrium and that when the omental sac was developed, it occupied a position in the posterior wall of that sac.

### Regeneration of the Liver.

F. C. FISHBACK (*Archives of Pathology*, June, 1929) states that use of the term regeneration implies compensation, either structural or physiological. He holds that as far as the liver is concerned, it would be more correct to speak of restoration or restitution, since the replacement does not occur at the stump from which lobes have been removed, but within the remaining lobes. He has removed portions of the liver from dogs and studied the restoration. He found that extirpation of two-thirds of the organ gave the greatest impetus to regeneration. Regeneration was complete in six to eight weeks. The process consists of hypertrophy of the remaining lobes. The lobules undergo a hyperplastic budding process at their periphery; the new lobules are so similar in size and shape that they cannot be distinguished from the old ones. Hepatic cells are the main source of new tissue, but buds of the bile ducts play a definite part in the process. The budding duct cells

undergo a gradual transition to form new hepatic cells. The stress of regeneration causes reversion to the primitive mode of production of hepatic cells. The ability of the liver to regenerate is potentially infinite. It will be restored after partial hepatectomy for a second or even a third time. After this the process is limited by technical difficulties of hæmostasis.

## MORPHOLOGY.

### The Comparative Study of Placentation in Reptiles.

H. CLAIRE WEEKES (*Proceedings of the Linnean Society of New South Wales*, May, 1929) records for the first time placentation in snakes. The placentæ of both *Denisonia superba* and that of *Denisonia suta* are identical. The earliest material of *Denisonia superba* is somewhat similar to a four weeks lizard embryo; other embryos of both forms are well advanced in development. These snakes are not strictly viviparous in that a remnant of shell membrane envelopes the blastocysts at the stages observed. Since the allantois extends beneath the yolk sac comparatively early, there is no omphalo-placenta; but over the entire allantoic surface there is a well developed allantoic placenta, by means of which fœtal and maternal blood streams are in close apposition. In the uterine wall partially degenerate epithelium exposes engorged capillaries, while the embryonic portion of the placenta is composed of chorio-allantoic or chorio-omphalo-allantoic membrane with vessels also exposed; occasional large chorionic ectoderm cells serve to attach fœtal to maternal tissues. In a small area the maternal wall is raised into villous ridges about which the fœtal tissue is folded. The placentation of these snakes shows certain features in common with that of the lizards, *Lygosoma quoyi* and *Lygosoma entrecasteauxi*. Observations on the placentation of the lizard *Lygosoma weekesæ* are made upon a series of embryos ranging from approximately two to ten weeks in age. This lizard is not strictly viviparous, as a fragment of shell membrane occurs at the base of the yolk sac. There are both omphaloplacentæ and allantoplacentæ; with growth of the embryo, the yolk sac decreases in size, the early omphaloplacenta then being replaced functionally by the allantoplacenta. The omphaloplacenta consists of a vascular uterine wall with columnar epithelium underlying a sheet of enlarged chorionic ectoderm cells covering the well vascularized yolk sac. As in *Lygosoma quoyi*, the extra-embryonic mesoderm grows round the yolk sac and there is a similar arrangement of the umbilical vessels. The allantoplacenta is composed of an elliptical ridged region of maternal vascular villous ridges lined by cubical epithelium overlying but in no way attached to much enlarged chorionic ectoderm cells and of a smooth portion where maternal and fœtal blood streams are in close proximity as a result of partial degeneration of fœtal and maternal tissue. It is concluded that the placentation of *Lygosoma weekesæ* is less specialized than that of *Lygosoma entrecasteauxi* and *Chalcides tridactylus*. The above observations lend support to the hypothesis of independent evolution of the placenta in different groups of related animals.

### The Duration of Luteal Activity During Pregnancy.

R. COURRIER AND R. KEHL (*Comptes Rendus des Séances de la Société de Biologie*, June, 1929) state that whilst it is now generally agreed that the presence of the *corpus luteum* is necessary during early pregnancy, opinions differ as to the duration of luteal activity. Ancel and Bouin find that in the pseudopregnant rabbit the evolution of the endometrium is directly related to that of the *corpus luteum*; involution of the uterus is well advanced about the fourteenth day after coitus with a male whose *vas deferens* has been ligated, and at the twenty-four day the resting condition prevails. The authors have used rabbits in which only one uterine cornu is pregnant, a condition obtained by separation of one oviduct before coitus or by tubal ligature in the interval between ovulation and the arrival of embryos in the uterus. During early pregnancy the non-pregnant cornu undergoes the usual development; then occurs involution as in pseudopregnancy, but with the difference that regression is not noticeable until the eighteenth day. The contrast is still greater at the twenty-third day, when in the non-pregnant cornu involution is not yet complete, while the uterus of the pseudopregnant animal is in the typical resting condition. There is no doubt that endometrial regression during pregnancy is connected with cessation of luteal activity and this work shows that in the rabbit the *corpus luteum* is not indispensable until parturition. In order to substantiate this evidence further experiments are being carried out to prove that the endometrium does not atrophy if the period of luteal activity be prolonged artificially.

### The Function of the Epididymis.

WM. C. YOUNG (*Journal of Morphology and Physiology*, Volume XLVII, June, 1929) states that during the past few years many functions have been assigned to the epididymis which have been supplementary to its rôle in sperm storage and to its secretory activity. One of these, the suggestion that sperms attain full maturity and are strengthened in consequence of some action of its secretion, has been reinvestigated as the first part of a study which is intended to include other aspects of the problem. No evidence in support of the theory was obtained by the author from a series of experiments on various mammals representing a repetition and extension of earlier work. On the contrary, the strengthening and attainment of full spermatozoon maturity would seem to be the outcome of changes which are inherent in the sperms themselves. It is suggested, therefore, until other aspects of the subject can be reinvestigated, that the epididymis is simply a reservoir for sperm. In the reservoir processes of sperm development which start while the sperms are still contained in the testis, are free to continue because of the favourable environment.

### The Origin of Racial Characteristics in Man.

L. BOLK (*American Journal of Physical Anthropology*, April-June, 1929) discusses the thesis which he has previously put forward—that progressive evolution in man is due to retardation of development of certain characters and what may be called increased fœtalization, further quantitative differences in fœtalization and retardation are the bases of racial differences. This general thesis wherein Bolk maintains that nearly all the typical characteristics of the human body are simply persistent fœtal features, is discussed in relationship to cephalic index—the eruption of teeth, pigmentation of the skin, hair and eyes, the persistence of an epicanthus, the development of the hands and feet *et cetera*. For example, he suggests that the earliest condition of the skull in primates was one of brachycephaly, that this changed in more primitive races to a dolichocephalic condition and that the return to brachycephaly is simply due to a persistence of the early fœtal character. He emphasizes the fact that knowledge of the physiological differences between various races is as yet very defective. R. Pearl, examining statistics of the duration of life, showed that the expectation of life for white males was 54 years and for negro males 40·4 years. While other factors may be concerned in this phenomenon, the author suggests that this is an example of increased retardation of development in the white race. Again, in the colour of hair and eyes the formation of pigment is an expression of degree of fœtalization and hence the Nordic race is the most progressive as regards this character. He shows that the epicanthic fold is normally seen in the white fœtus, together with depressed nasal bridge and exophthalmos. Finally, in contrasting the negro and the white race he observes that in the negro, the long skull, black skin, strong prognathism, older type of dentition, structure of their hands and feet and the more rapid course of development and life, all show that they represent a special, less fœtalized and less retarded group of mankind.

# British Medical Association News.

## SCIENTIFIC.

A MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Royal Prince Alfred Hospital on May 16, 1929, DR. E. M. HUMPHERY in the chair.

### Lacerated Wound of the Knee Joint.

MR. E. M. FISHER showed a boy, aged nine years, who had fallen from a tree on to a spiked iron plantation fence, sustaining two lacerated wounds about the knee. One wound had been transverse and had exposed the patellar tendon. The other had been on the lateral aspect of the knee joint and had extended from the patellar tendon to five centimetres (two inches) above the patella; the knee joint had been opened up widely and a chip had been knocked off the upper lateral corner of the patella. The boy had been in great pain on admission; his temperature had been 38·3° C. (101° F.) and his pulse rate 130 in the minute. Operation had been performed on the same day. The ragged edges of skin, superficial and deep fascia, synovial membrane and capsule and some areolar tissue had been excised and the wounds had been sewn up without drainage. The wound had healed almost by first intention, only one spot gaping a little. At the time of the meeting, four years later, the patient had full use of his joint.

### Compound Fracture of the Humerus.

Mr. Fisher also showed a male patient, aged twenty-six years. A cart containing about two tons of stone had run across his right humerus. It had caused a compound fracture about the middle of the shaft with a good deal of damage to the soft parts.

At operation on the following day, about twenty hours later, the ragged edges of skin had been removed and the *brachialis* and biceps muscles had been found torn across and retracted with some offensive old blood in the interval. This had been cleaned out, the damaged muscle ends had been trimmed and the wound sewn up without drainage. Healing had taken place by first intention and the fracture had healed solidly without infection.

Mr. Fisher said that the two cases demonstrated by him showed the results of the application of excision of wounds and immediate suture which had been developed during the war. It has a fairly wide application in the wounds and compound fractures of civil practice. The technique was important. Every effort should be made to avoid introducing anything into the wound and gentle handling was necessary. The skin was dry shaved always away from the edges of the wound and the skin prepared with tincture of iodine only. Then gloves, gowns, sheets, instruments were changed. In sewing the wound it was important to avoid tension as much as possible. When the wound was large and there was a possibility of serum or blood accumulating, drainage for about twenty-four hours should not interfere with healing.

### Fracture of the Humerus, Radius and Ulna and Severed Tendons.

MR. J. COLVIN STOREY showed a man, aged twenty-six years, a labourer, who had been admitted to hospital on February 10, 1928, having been injured at work by a large steel girder falling on to his arm. He had been taken to the operating theatre and under general anæsthesia the arm which was covered with dirt, had been cleaned. He had been found to be suffering from a fracture of the humerus in the middle third, compound fracture of the left radius and ulna in the lower third and laceration of the back of the hand, all the dorsal tendons having been severed and the metacarpal bones having been exposed and apparently comminuted. The extensor tendons had been sutured and the skin flaps had been lightly sutured with fishing gut. The wound had been treated with bismuth, iodoform and paraffin paste and a dressing had been applied. The arm and forearm had then been placed in an aluminium posterior angular splint with separate aluminium volar and ulnar splints for the forearm; the forearm had been in a position of supination and the elbow had been flexed to a right angle.

On February 13, 1928, the radiologist had reported the presence of the following lesions: (i) Fracture of the left humerus in the middle third, with pronounced angulation of the fragments at the site of fracture; when viewed from the antero-posterior aspect the bones had been in apposition for about one-third of their diameter and when viewed from the lateral aspect for about two-thirds of their diameter. (ii) Fracture of the left radius and ulna in their distal third, with dorsal and slight lateral displacement of the distal radial fragment; when viewed from the antero-posterior aspect the bones had been in apposition for one-third of their diameter and dorsal angulation of the ulna had been present at the site of fracture. (iii) Fracture of the radius 1·25 centimetres (half an inch) proximal to the wrist without displacement. (iv) Fracture of the navicular bone. The bismuth, iodoform and paraffin paste had interfered with the X ray appearance of the hand. The fractures had been manipulated into better position, the wounds had been clean and had been healing well.

On February 18, 1928, the radiologist had reported very slight anterior angulation of the distal humeral fragment; the distal radial fragment had been displaced dorsally and there had been very slight ulnar angulation of both bones at the site of fracture; there had been a fracture of the third metacarpal bone. From this time onwards improvement had been gradual and continuous. At the time of the meeting the function of the shoulder was excellent, full flexion and extension were present at the elbow joint, the patient could pronate and supinate his forearm and could flex his fingers well, though extension was still somewhat limited. Mr. Storey pointed out it was sometimes necessary to pay more attention to the functional than to the anatomical result. The anatomical result in the patient might not be perfect, but the patient had a useful hand and could do his work just as well as before the accident.

### Tertiary Syphilis with a Combined System Disease of the Spinal Cord.

DR. A. J. COLLINS showed a man, aged thirty-six years, who gave a history that in December, 1927, he had noticed numbness in the right leg; this had continued ever since. Three or four months later he had developed numbness in the left leg. At the commencement of the illness he had developed shakiness in the right lower limb and after some months a similar condition in the left lower limb. Side by side with this he had had gradual loss of power in both limbs. He had been obliged to use crutches for over six months.

It was pointed out that there was some numbness in the left lower limb, but none in the right. There was no loss of power in either limb. The patient had no bladder symptoms and no pain. He had had no previous illness. Examination revealed spastc paraplegia of both lower limbs. Patellar and ankle clonus were present on the right side and the plantar reflex on both sides was extensor in type. There was wasting to the extent of 2·5 centimetres (one inch) in the lower part of the right thigh. On the left side the knee jerks were decidedly diminished and the spasticity was not so great as on the right side. There was no actual anæsthesia, but there was subjective numbness all over the lower limbs. There were no fibrillary twitchings. Both the blood serum and the cerebrospinal fluid had yielded a reaction to the Wassermann test. Antisyphilitic treatment had been carried out for three months by intramuscular injections of "Muthanol." The patient was able to walk better and the subjective numbness had become confined to his feet.

### Subacute Combined Degeneration of the Spinal Cord.

Dr. Collins also showed a man, aged thirty-nine years, who gave a history of having suffered from dengue fever three years previously. About six months later the patient's feet had begun to drag and he had felt a sensation of pins and needles in the lower limbs and abdomen.

The condition had gradually progressed with increasing stiffness of the lower limbs and difficulty in walking. The progress of symptoms had been much more rapid during the last few weeks. The symptoms had been bilateral since the beginning. There was no pain. The patient had no loss of control over the sphincters, but he had occasional attacks of abdominal distension. When these occurred, he had great difficulty in walking. According to the family history one of the patient's sisters had died of pernicious anæmia at the age of sixty years. Another sister had died eight months previously at the age of forty-two of acute mania; she had been thought to be anæmic.

Examination revealed extensive spastic paraplegia with double patellar and ankle clonus. There was a double extensor plantar reflex. There was a slight dulling of sensation below the twelfth thoracic segment on each side, but no anæsthesia. Both the blood serum and the cerebro-spinal fluid had failed to yield a reaction to the Wassermann test. Kahn's flocculation test had also failed to yield a reaction. The patient had been unable to retain the tube during the fractional test meal analysis, but the gastric contents vomited during the attempt had contained no free acid. The blood picture was typical of pernicious anæmia. Since his admission to hospital the patient had developed retention of urine with acute cystitis.

### Syringomyelia and Hæmatomyelia.

DR. ALLAN S. WALKER showed a boy, aged fifteen years, who had been well up to eleven months previously, when after a sudden shock induced by a trivial cause and quite unassociated with any physical trauma he had felt immediate pain in the left side of the chest. A little later in the day he had been unable to stand on the right leg and had been staggering and giddy. He had made attempts to walk, but had finally been brought home where he stayed in bed for two weeks suffering from inability to move the right leg and pronounced weakness of the right arm and hand. Hiccup had been troublesome. There had been no diplopia nor affection of speech. Bladder control had been lost.

Dr. Walker said that he could not report the patient's sensory condition at this time, as he had not seen him till a month after the onset. Then he had been able to walk with a dragging gait, the right leg being noticeably weak, and both upper extremities weak, the right very definitely so, especially in the hand. There had been some wasting of the right ulnar muscle groups. He had had moderately good bladder control, but micturition had been precipitate. Nystagmus had been present, the right pupil contracted and there had been slight right exophthalmos. The abdominal and epigastric reflexes had been absent and all lower deep reflexes much exaggerated. On the right side ankle clonus had been obtained and the right plantar reflex had been definitely extensor in type and the left plantar reflex doubtfully extensor. All leg muscles had been weak, especially on the right side and slightly spastic. The sensation of touch had been unimpaired, deep sensations had perhaps been very slightly dulled over the left lower lumbar cord levels, but only as evidenced by testing vibration sense. Heat and cold discrimination had been somewhat impaired from the first dorsal root level to the seventh and greatly impaired from the seventh dorsal to the third to fifth lumbar zones. Pain sense had been much diminished from the seventh dorsal to the fifth lumbar levels. The loss in each case had been more considerable and even on the left side. Attacks of hiccup had been still rather easily induced.

The blood and cerebro-spinal fluid had failed to react to the Wassermann test and there had been no blood nor increased globulin in the spinal fluid.

After one month in hospital he had been distinctly better as regards muscular power, though the right hand had assumed a very definite claw shape, but the sensory loss had been little altered except down to the mid-dorsal cord zone down to which point sensation had become almost normal.

He had returned every three weeks for X ray applications to the spine for several months. Twice a reaction had been induced by the radiation, once taking the form of vomiting and once that of increased bladder irritability.

An interesting detail in his later history was that he described his legs as being "very sensitive." Inquiry had proved that he meant that they twitched readily and were subject to flexor spasms, though no pain was felt in them.

Dr. Walker pointed out that the patient's present condition was briefly that of a partial right cervical sympathetic palsy, an atrophic paralysis of the intrinsic muscles of the right hand and muscles on the ulnar side of the right forearm, with slight lower limb spasticity, more evident on the right side. He still had dissociated anæsthesia from the mid-dorsal to the lower lumbar cord areas, more evident on the left side.

The sudden lesion of nearly a year previously, though it temporarily involved the diaphragm cord level (third to fifth cervical) had as its upper limit the seventh cervical segment, since the sixth segment innervating the intact long flexors and extensors of the hand was spared. A lesion at this level also took in the cervical sympathetic. The upper dorsal root areas were slightly affected, but the chief sensory loss started at the seventh dorsal root zone which corresponded to the supply area for the skin segment, where the first pain had been felt and also to the arc responsible for the epigastric reflex. Thus he probably had had a hæmorrhage into the cord at about the mid-dorsal level, not a massive, rapid bleeding, however, else his symptoms would have been more dramatic. Here his pyramidal tracts had been compressed and also the crossed lateral paths for pain and temperature sense in the posterior commissure on the spirothalamic tracts. Posterior columns had been spared. The atrophic palsy in the hand had been slower and at first less intense. Possibly the local destruction of cells in the lowest cervical and first dorsal areas of the cord had been in part due to a gliosis stimulated by the vascular accident. Such accidents were known to be not uncommon in syringomyelia and though it was not known if this patient had shown any signs of nervous system affection prior to his acute illness, it was difficult to imagine a cord hæmorrhage *per se* producing such curious signs, unless in association with a latent syringomyelia. A spreading effusion or œdema above and below the site of the original lesion could readily explain the widespread findings and the subsequent contraction of the areas of motor and sensory loss. The latter areas had become more patchy of recent months and sensory changes were most readily demonstrated between the fifth and tenth dorsal levels and between the second and fifth lumbar. This patchiness was quite consistent with the known pathology of the disease.

### Intrathoracic Neoplasm.

DR. C. K. DUNSTAN showed a patient, fifty-six years of age, who had come to hospital on April 15, 1929, complaining of hoarseness of five months' duration and difficulty in swallowing fluids for two weeks. A week or so before the onset of the horaseness he had received a heavy blow on the left side of the chest which caused him severe pain and difficulty in breathing. About a week after the onset of hoarseness, while doing some heavy pulling with his arms, he had "strained" his chest. This had been followed by three days of severe pain on movement and deep breathing. The hoarseness had then increased and he had noticed that he was losing weight, becoming much weaker and getting more short winded. Difficulty in swallowing fluids had then followed. There had been no cough to speak of, but when he had coughed, he had brought up phlegm streaked with black. On examination the left vocal cord had been found affected by abductor paralysis. There had been a small area of impaired resonance in the right upper parasternal region and over this had been heard a soft blowing systolic murmur. The aortic sound had not been accentuated and the heart had been otherwise normal. There had been harsh breathing with bronchial quality and increased vocal resonance under the sternal end of the right clavicle and an area of left paravertebral impairment of the percussion note. The serum had not reacted to the Wassermann test and X ray examination had revealed a large dense opacity extending outwards from the left hilum with an irregular

border infiltrating the lung, the appearance suggesting a primary neoplasm rather than any other condition. A lateral skiagram had revealed an opacity in the posterior mediastinum, strongly suggestive of neoplasm. Since then the patient had been getting much weaker and more breathless on exertion. He had lost 9·5 kilograms (one and a half stone) in three months. For the previous week or so he had been complaining of a burning pain in the left side of the chest. A second film, taken a month after the first, revealed no alteration in the size of the mass.

### Aneurysm of the Aorta.

Dr. Dunstan also showed a patient, fifty-eight years of age, who had come to hospital on January 31, 1929, complaining of hoarseness and pains in the chest of three months' duration. The patient had had no previous illnesses apart from intermittent attacks of "rheumatic gout." He admitted having contracted venereal disease at the age of eighteen years. He had first noticed the hoarseness and the pain in the chest after a bad cold which occurred three months before he came to hospital. The hoarseness had not got either better or worse during the three months. He had noticed that the pain always occurred at night when he was in bed. He became short-winded on moderate exertion and had lost about 3·2 kilograms (seven pounds) in weight. Dr. Dunstan said that the patient's left vocal cord was fixed in the cadaveric position. There was definite pulsation over the sternum and a large area of dulness over and to the right of the upper end of the sternum. The apex was in the sixth intercostal space, about 1·25 centimetres (half an inch) outside the nipple line and the impulse was prolonged and heaving in character. A blowing systolic murmur was heard at the mitral and aortic areas and the second aortic sound was definitely accentuated. No abnormality was to be detected in the lungs. The skiagram revealed a very great dilatation of the whole of the aortic arch. The response to the Wassermann test was "+++." Since January 31, 1929, the symptoms had not altered, except that the patient thought that he had lost nearly another 6·3 kilograms (one stone) in weight.

### Still's Form of Arthritis Deformans.

DR. C. BICKERTON BLACKBURN showed a single girl, a waitress, aged eighteen, who had been admitted to hospital on February 20, 1929, complaining of pains in the knees and arms of nine months' duration. Though the diagnosis of Still's disease made at the time the list was prepared could no longer stand, he had allowed it to remain in order to call attention to the unusual features of the case.

For the past nine months the patient had had attacks of pain and swelling in various joints, first in the right knee, later in the left as well and at times in the left shoulder and left wrist. During attacks the temperature had been raised for a day or two to 38·3° or 38·9° C. (101° or 102° F.).

At first the attacks had been of short duration, often about a week, but latterly the knees had been continuously swollen and she had had to hobble about. Her menses had at first been irregular and she had had amenorrhœa for five months. Recently she had been rather breathless when walking. She had had her upper teeth extracted for decay since the illness began.

Dr. Blackburn pointed out that the patient was a slight, frail-looking girl. Both knees were swollen and not painful and only slightly tender, but a week previously the right knee had been very painful and tender and tense with an effusion which had been aspirated and found to be sterile on culture. When pain was absent there was little limitation of movement, though she limped when walking.

The glands were definitely enlarged in the axilla, supraclavicular regions, both groins and femoral regions. The glands were rather hard, discrete and usually not tender. During the previous week, however, when the right knee had become so swollen, the right femoral group of glands had been greatly swollen, very painful and intensely tender. The spleen was palpable about 2·5 centimetres (one inch) below the costal margin; the area of splenic dulness was greatly increased. There was very definite uniform, soft enlargement of the thyreoid gland. No abnormality was detected in the other systems.

Several clinical examinations had been carried out. The basal metabolic rate had been estimated at +16·8%. A fractional test meal had revealed achlorhydria and streptococci had been cultured from the gastric juice. X ray examination had revealed no bony change in the knee joints, but periostitis in the lower third of the right femur. A blood count had been made with the following result:

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| Erythrocytes, per cubic millimetre | 3,270,000 |
| Hæmoglobin value | 60% |
| Colour index | 0·9 |
| Leucocytes, per cubic millimetre | 3,500 |
| Neutrophile cells | 29·5% |
| Lymphocytes | 63% |
| Large mononuclear cells | 2·5% |
| Eosinophile cells | 0·5% |

The patient had been treated by thermal therapy, a shock vaccine of *Bacillus coli communis* had been used and given by intravenous injections. An autogenous vaccine, obtained from the streptococci of the gastric contents, had also been used.

Up to a week previously progress, though slow, had been steady. She had looked and felt better and her knees had been less swollen and tender and she had improved in her walking.

The right knee had then become more swollen as above stated and to a less extent the left and the temperature had taken on a hectic character, rising to 39·4° C. (103° F.) at night and falling to normal in the morning.

A second blood count had then been made with the following result:

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| Erythrocytes, per cubic millimetre | 2,500,000 |
| Hæmoglobin value | 50% |
| Leucocytes, per cubic millimetre | 67,200 |

There were a few lymphocytes and a few neutrophile cells. The remaining cells, the great majority, were mononuclear cells of varying size with some variation in the shape of the nucleus. The absence of recognizable myelocytes seemed to be against myeloid leuchæmia. (This was Dr. Tebbutt's report upon the film.)

Since the patient was shown at the meeting we have been supplied with the following further notes.

The patient became much worse, wasting rapidly, with hectic temperature and anorexia. A week later the blood count was:

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| Erythrocytes, per cubic millimetre | 2,990,000 |
| Hæmoglobin value | 45% |
| Colour index | 0·7 |
| Leucocytes, per cubic millimetre | 131,700 |

The report upon the white cells was identical with the last.

A week later X rays were applied to the spleen, after which there was complaint of pain over the spleen and diarrhœa and three days after treatment the spleen was no longer palpable. A week after the X ray treatment the blood count revealed:

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| Erythrocytes, per cubic millimetre | 2,910,000 |
| Hæmoglobin value | 41% |
| Colour index | 0·8 |
| Leucocytes, per cubic millimetre | 9,900 |
| Neutrophile cells | 24% |
| Lymphocytes | 76% |

Definite anisocytosis and moderate poikilocytosis were present. The condition was now extremely low and two days later right-sided pleurisy developed and the patient died the next day. A *post mortem* examination was refused.

### Plastic Reconstruction of the Scrotum.

MR. R. GORDON CRAIG showed a man on whom he had done an operation for reconstruction of the scrotum following sloughing consequent on extravasation of urine This case will be reported in full in a subsequent issue.

### Congenital Diaphragmatic Hernia.

MR. ST. J. W. DANSEY showed a *post mortem* specimen of a large congenital diaphragmatic hernia. It is hoped to publish an account of this specimen in a subsequent issue.

### Progressive Lenticular Degeneration.

PROFESSOR W. S. DAWSON showed a young man, aged eighteen years, who had been healthy up till four years previously. He had made good progress at school. After an attack of dengue fever he had had difficulty in speaking, he had talked as if he had something in his mouth. His enlarged tonsils had been removed without any benefit to his articulation. A little later he had had a shakiness in his left hand. His condition had become steadily worse, particularly during the last few months. He had become very emotional. The chief points to be noted were the following: (i) Gross dysarthria, (ii) the open mouth and the face rather lacking in expression, (iii) gross tremor in both arms, especially under the influence of emotion and when beginning any movement, (iv) the attitude of the left hand, partial flexion and ulnar deviation, (v) the resistance to supination of the left forearm, (vi) the briskness of all tendon reflexes, (vii) the absence of history or signs suggesting hepatic deficiency.

Professor Dawson said that a sister of the patient, aged thirty-four years, had never been well since a dietetic indiscretion three years previously when she had eaten eighteen or twenty cucumbers. Her voice had been weak and she had been noticed to tremble. During the previous six months her speech had become far less distinct and the tremor of the forearms was more pronounced. She had also become very emotional.

### Unusual Muscular Contractions.

DR. R. A. NOBLE showed two patients who exhibited unusual muscular contractions. A report of these two patients will be published in a subsequent issue.

### Hydatidiform Mole with Complications.

DR. F. A. MAGUIRE showed a female patient, aged twenty-nine years, who had been admitted on January 22, 1929, with a history of four months' amenorrhœa and complaining of breathlessness on exertion for seven weeks, together with œdema of the vulva. Seven weeks before admission she had passed a small clot *per vaginam*.

On examination the vulva had been found very œdematous, the uterus had been the size of a four months pregnancy and a large ovarian cyst had been felt in the right side below the uterus. The urine had contained a definite cloud of albumin. Slight œdema of the ankles had been present.

At operation the following day these findings had been confirmed and the ovarian cyst, 15·0 by 12·5 by 10·0 centimetres (six by five by four inches) had been removed, though it ruptured. Two days later the patient had suffered from some steady bleeding *per vaginam* and had complained of some intermittent pain in the lower part of the abdomen. The vagina had been packed without an anæsthetic being used, but a few hours later the packing had been expelled and the bleeding had continued. The vagina had been repacked under an anæsthetic, but in two hours the packing had been expelled and a fœtus and placenta had been found in the vagina. At operation two hours later the fœtus and placenta had been removed. Portion of the placenta had undergone hydatidiform degeneration and the uterus had been gently curetted. An intravenous injection of gum saline solution had been given at the same time. On the following day the patient's condition had improved, but on examination of the urine it had been found to contain "one-quarter" albumin. Improvement had continued until February 2, 1929, eleven days after the operation, when her temperature had risen suddenly to 39·4° C. (103° F.) without the occurrence of a rigor.

Two days later, on receipt of a report from Dr. A. H. Tebbutt and Dr. Keith Inglis that the sections of the hydatidiform placenta resembled chorionic epithelioma in places, the uterus had been again curetted and in the tissue removed no traces of chorionic cancer had been found. The patient's temperature had remained high—from 38·3° to 39·4° C. (101° to 103° F.) until three days later when it had fallen to normal and had remained normal for another six days. At this time (February 16, 1929) the patient had felt well, had been passing a litre to a litre and a half of urine a day and the albuminuria had been diminishing.

On February 17, 1929, the patient's temperature had risen in the evening to 38·3° C. (101° F.) and for the next fortnight it had varied from normal to between 38·9° and 39·4° C. (102° and 103° F.). The patient had been very ill during this time, but had not complained of any particular symptoms. No rigors had been noted and no painful spots. The honorary physician in consultation had considered the condition to be due to infective endocarditis. Two blood cultures made during this period had been sterile. After two weeks the patient's temperature had dropped and had become normal in two days. It had remained normal until discharge from hospital on March 23, 1929.

When discharged, the patient had been feeling well, there had been no œdema anywhere, there had been no cardiac signs, except that the apex beat had been 11·5 centimetres (four and a half inches) from the middle line in the fifth intercostal space and that there was a soft systolic murmur at the apex. The urine had been normal.

### Chorionepithelioma.

Dr. Maguire's second patient was a single girl, aged seventeen years, a factory hand, who had been admitted to the casualty department on April 19, 1929, with a history of amenorrhœa since February 4, 1929, and slight hæmorrhage for two weeks. For three hours before admission she had been suffering from pains which were constant, radiating from the lower dorsal region to below the umbilicus. Whilst in the casualty department, the patient had expelled a small fœtus and what appeared to be a hydatid mole. The patient had been admitted to hospital and the specimen had been sent to the pathological department. One week after the day of admission, though the patient had been feeling well and had had no hæmorrhage, the uterus had still felt enlarged and boggy. It had been curetted and much *débris* had been removed. On April 29, 1929, Dr. Davies, supported by Dr. Tebbutt and Dr. Inglis, had reported that the specimen sent from the casualty department was a chorionic carcinoma. At operation on May 5, 1929, the uterus which was apparently normal, had been removed together with the right ovary which was cystic. Recovery to date had been uneventful. Three days after operation it had been reported that in the scrapings removed on April 26, 1929, no trace of chorionic carcinoma could be found.

### Transplantation of Ureter.

Dr. Maguire also showed a married woman, aged forty-one years, who had been admitted to hospital on June 18, 1928, complaining of excessive menstrual flow for two years, vaginal hæmorrhage after straining, diarrhœa for two months and backache for one month.

On examination a nodular tumour arising from the pelvis had been felt, which on examination was found to be the uterus, enlarged and irregular, due to multiple fibroids. The cervix had been carcinomatous.

At operation next day a bicornuate uterus had been found with many fibroids. Many adhesions on the left side and left hydrosalpinx and left cystic ovary had also been found. No right ureter had been discovered, the left being enlarged and the left kidney was large and bilobed. The uterus, tubes and ovaries had been removed and while the left side of the pelvis which was infiltrated, was being cleared, the ureter had been divided. It had been implanted into the iliac colon by Coffey's method. A drainage tube had been inserted. Healing had been uneventful and the patient had been discharged in one month, passing urine by the rectum, feeling well and returning regularly for an autogenous vaccine prepared from urine.

### Ruptured Ectopic Gestation.

Dr. Maguire also related the history of a married woman, aged forty-two years, who had been married for fifteen years and had become pregnant for the first time. She had been admitted on May 12, 1929, with a history of having missed three menstrual periods and of slight pains in the lower part of the abdomen which had gradually become worse. She had had a feeling of nausea, she had not vomited, but had felt faint. No vaginal bleeding had occurred. On admission the patient had appeared collapsed, had been very pale and sweating and had had shallow rapid respiration and cold extremities. The temperature had been 35° C. (95° F.), the pulse rate 102 and the respiratory rate 28 in the minute. The pulse had been very soft and weak, the abdomen slightly distended and tender in its lower part and dull on percussion in both flanks. The urine had been normal. At operation the abdominal cavity had been found filled with blood and many adhesions had been found in and about the pelvis. The fœtus had soon come into view and after the blood clot was cleared away there had been found a large rent in the right broad ligament which was the thickness of a large sausage. Hæmostatic sutures had been tied at the medial and lateral ends of this swelling and as much as possible of the wall of the cavity had been removed and the remainder oversewn. A litre of gum saline solution infusion had been given at the time of operation. After operation the patient had vomited a great deal and later on abdominal distension had supervened. The patient had died while the stomach tube was being passed. At *post mortem* examination nothing very abnormal had been found, but the blood urea estimation had yielded a figure of 90.

### Extradural Abscess.

DR. E. SUSMAN, on behalf of himself and Acting Professor B. T. EDYE, showed a male patient, aged twenty years, a knitter, who had been admitted to Royal Prince Alfred Hospital on April 2, 1929, suffering from constant headache and recurring attacks of vomiting. Six years previously he had suffered from osteomyelitis of the right tibia, which had necessitated three operations at Marrickville Hospital. There had been a discharge from the right leg ever since. He also stated he had had "neuritis" of both shoulders during the previous three years. About seven weeks before admission, whilst at work, he had experienced a sudden violent headache which was localized over the right frontal and parietal regions. The pains had been sharp and shooting in character, at first radiating down over the right eye, but they had become dull and constant at the time of admission. Four weeks before admission he had had attacks of vomiting which generally followed the taking of some food, but would come on quickly without much nausea. Vomiting attacks would occur three or four times a day and sometimes as much as three hundred cubic centimetres (half a pint) would be ejected. His eyes had also become easily tired.

Examination had revealed a sallow complexioned young man with scars on the right leg and a discharging sinus. Old scars had been present also on the sternum, left arm and both hips. Three discharging sinuses had also been present on the right arm and recent X ray examination of this region had revealed chronic osteomyelitis of the junction of the upper and middle third of the right humerus, with several sequestra separating. There had been a fluctuant tender tumour over the highest part of the cranium, in front of the posterior fontanelle. Cranial nerves had been normal, but nystagmus to the left had been noted. There had been no motor paralysis; the gait had been normal and there had been no loss of coordinate movements and no muscular atrophy. There had been no sensory disturbances. The conjunctival, pupillary, palatal, epigastric and abdominal reflexes had been present on each side and the wrist, elbow, knee and ankle jerks had been present and equal on both sides. There had been no difficulty in deglutition or micturition. His bowels had acted naturally and other systems had been clear, except for an occasional dropped heart beat heard at the mitral area. A culture of his blood had been sterile after seventy-two hours' incubation and X ray examination of the skull had not revealed any definite evidence of osteomyelitis at that time. The tumour of the scalp had increased in size daily, while his general condition had improved, vomiting being less frequent and headache much easier.

On April 10, 1929, under general anæsthesia, the tumour had been opened and about three hundred cubic centimetres (ten ounces) of thick yellow pus evacuated. The parietal bones on either side of the sagittal suture had been bare and denuded of periosteum. The parietal bones had been trephined on either side of the sagittal suture and about one hundred and eighty cubic centimetres (six ounces) of pus from an extradural abscess obtained, mainly from the right side. Five days later the right temporal region had been trephined and a small amount of pus obtained which connected with the abscess drained at the previous operation. The right parietal bone had also been trephined about midway between the previous trephine hole and the temporal trephine and about thirty cubic centimetres (one ounce) of pus obtained. On May 3, 1929, another incision into the first wound had been made on the scalp, releasing about fifteen cubic centimetres (half an ounce) of pus. A profuse growth of *Staphylococcus aureus* had been obtained in pure culture from the pus.

Since the last operation the patient's condition had been consistently good.

### Skiagrams.

A series of interesting skiagrams was demonstrated by both Dr. H. R. Sear and Dr. Phillip Parkinson.

## NOMINATIONS AND ELECTIONS.

THE undermentioned has been elected a member of the Victorian Branch of the British Medical Association:

Williams, Martin Frank, M.B., B.S., B.V.Sc., 1928 (Univ. Melbourne), 128, Victoria Street, Auburn.

## Correspondence.

### "KARNA VITA."

SIR: The account of "Karna Vita" given in the journal of May 18, 1929, by your analytical department gave me considerable surprise. I had been under the impression that the results obtained by its use in pernicious anæmia were far from satisfactory. Several patients suffering from pernicious anæmia who have come to have progress blood counts, were very eloquent in condemning the extract, on account of the extreme nausea it caused them. Inquiries at one of the largest of Sydney public hospitals showed that the use of "Karna Vita" had to be discontinued for the following reasons:

(i) Its nauseating taste and the nausea resulting after its ingestion (due, no doubt, to its high fat content), (ii) its insolubility in warm water, (iii) the impossibility of feeding it in the form of sandwiches or mixed with other food, on account of its bulk in effective doses.

I join issue with the statement that the taste of "Karna Vita" is not unpleasant. I got some half-dozen people to taste it and two other well-known liver extracts. All were unanimous in considering it much more objectionable than the other two.

As regards the price being reasonable, working on the assumption that the active principle contained in six ounces of fresh liver is required daily for effective results, we find the following interesting comparisons:

"Karna Vita" is equivalent to four times its weight of raw liver. Its retail price is 8s. 6d. for eight ounces, *id est* the equivalent of thirty-two ounces of raw liver and therefore an effective daily dose of "Karna Vita" would be one and a half ounces and would cost one shilling and seven-

pence. The British Drug House liver extract is done up in vials, each vial containing the active principle in eight ounces of raw liver; the retail price of a vial is 3s. 6d. and an effective daily dose would therefore cost two shillings and sevenpence. When one considers the relative bulk which has to be taken, one and a half ounces or forty-five grammes in the one case and less than five grammes in the other and the relative initial cost in the refining of the two substances, one must conclude that "Karna Vita" is actually dearer than the British Drug House extract.

In the account of the preparation of "Karna Vita" by your analytical department, no mention is given of the percentage of alcohol used in extracting the inactive substances from the liver. This is an important consideration, as the active principle is known to be soluble in a concentration of alcohol as high as 70%, so that unless absolute alcohol is being used, there must result some loss in potency (compare Cohn, Minot, Alles and Salter, *The Journal of Biological Chemistry*, May, 1928, Volume XXVII, page 339). Seeing that the preparation of a highly concentrated, potent liver extract is a relatively simple chemical procedure, it seems absurd that a product equally as potent and attractive as imported liver extract is not being made in Australia. When this is done, the extract could be sold at prices competitive with the imported article and one could say with your analytical department that such an extract should be given preference over imported extracts.

Yours, etc.,

F. S. HANSMAN.

143, Macquarie Street,
Sydney,
May 24, 1929.

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SIR: I was interested to read in your last issue that the results obtained from "Karna Vita" in pernicious anæmia in Sydney hospitals and elsewhere had been so excellent.

My experience, I regret to say, has been quite the reverse. After three weeks' treatment (*a*) on "Karna Vita" and (*b*) on Lilly's liver extract number 343 the contrast in the patient's condition was remarkable. "Karna Vita" was found to be most nauseating and generally unpleasant to take and could only be taken with the greatest difficulty, whereas the Lilly product was found to be quite pleasant and palatable and is still being taken with relish. It further had the effect of stopping the vomiting which had been such a persistent and distressing symptom for some time previously.

The blood picture is interesting. (i) Before treatment commenced it was as follows: red cells, 1,740,000 per cubic millimetre, hæmoglobin 35%, colour index 1, total leucocytes 2,900 per cubic millimetre. (ii) After three weeks on "Karna Vita" it rose to: red cells 1,970,000, hæmoglobin 40%, colour index 1, total leucocytes 3,400. (iii) Immediately thereafter Lilly's extract was used and after three weeks on this product it rose to: red cells 5,400,000, hæmoglobin 66%, colour index 0·62, total leucocytes 4,850. These figures may be confirmed by Dr. Hansman who prepared the blood counts. I trust that my experience has been an isolated one, but inquiries today would seem to show that some hospitals have had similar experience. The imported product is elegant and agreeable to handle and palatable to the patient. I do not think that the most ardent protagonists of the local product would make this claim. I fail, however, to see why such a product should not be forthcoming from some local laboratory.

Yours, etc.,

D. GULLIVER HUNTER, M.B.

Eastwood, May 22, 1929.

[Dr. Hansman and Dr. Hunter have put up a weak case against "Karna Vita." We have delayed in our reply in order that we might ascertain the experience of physicians holding senior appointments on the staffs of hospitals in Melbourne and Sydney. Our correspondents do not seem to realize that it is impossible to compare a desiccated preparation of an organ and an extract. When liver treatment of pernicious anæmia was first introduced by Minot and Murphy numerous attempts were made to substitute some palatable substance for cooked liver which many patients found to be unpleasant. In a discussion on this subject at a meeting of the New South Wales Branch of the British Medical Association on November 24, 1927, Dr. S. A. Smith referred to the use of a liver cocktail by some clinicians in the United States of America. The unpalatability of raw or cooked liver led some of the manufacturing chemists to prepare an extract. It was found that the extracts, although expensive, possessed the same therapeutic action as fresh liver. More recently preparations of dried liver have been used with good results. At the suggestion of a medical practitioner the President of the Metropolitan Meat Board of New South Wales undertook to conduct experiments with the object of placing on the market a desiccated liver preparation that would be cheap and efficacious. As a result of these experiments the "Karna Vita" Company was formed and the desiccated liver powder was tested by the medical practitioner referred to who is also an honorary physician at a large public hospital. He informs us that "the results obtained then were beyond our expectations." The word "our" presumably refers to himself and his colleagues at that hospital. He continues as follows: "I can show cases which bear out my statements. In fact I saw walking in Macquarie Street but a few days ago what was when she came under my care at the ———— Hospital a pretty hopeless looking case with subacute combined degeneration, so far advanced that she could not walk. When I saw her, she was walking with a stick and getting along quite comfortably. In using it in treatment a greater quantity *per diem* is required than of the imported preparations." Another honorary physician at a large public hospital in another city writes:

> I have had some experience with "Karna Vita" liver extract and am satisfied it is an active and efficient preparation in combating pernicious anæmia.
>
> One case with associated marked spinal sub-acute degeneration has shown great improvement in the anæmia and slight amelioration of the spinal symptoms. Another relapsing case of pernicious anæmia previously treated with an imported liver extract showed prompt improvement with "Karna Vita." Two very advanced cases, one with œdema and heart failure and one with advanced spinal cord changes and a large bed sore, were not improved and died. Another case of severe chronic anæmia of eight years' duration, needing frequent transfusions every one or two months, showed no response to either imported liver extract or to "Karna Vita." This particular case has resisted all treatment.
>
> To my mind "Karna Vita" is a welcome addition to our armamentarium because of its therapeutic potency; its relative cheapness compared with imported products is a big advantage to institutions and private patients.

The medical superintendents of two large hospitals speak in favour of "Karna Vita." The one states that they have used it in the treatment of several patients in the hospital and have found it quite efficient and "equal to any of the liver extracts. Of course, a greater quantity of 'Karna Vita' is required than of the proprietary article and this must be considered in estimating its value." He offers to provide detailed clinical accounts of the patients who were treated with it. The other wrote that the hospital records contained very few cases of pernicious anæmia treated exclusively with "Karna Vita." In most instances fresh liver has been substituted from time to time and in addition iron and arsenic have been given. He is of opinion "that 'Karna Vita' is a satisfactory preparation and has been very useful." In addition we have received favourable verbal accounts of its use from several experienced medical practitioners. We are therefore justified in concluding that its therapeutic action, if properly exhibited, is as good as that of fresh liver or of the extracts on the market. There are several references to the treatment

in this journal during the past twelve months. We are informed that in one hospital "Karna Vita" is given in boiling water. If this be a fact, it is obvious that little beneficial action will be obtained.

The next point to which Dr. Hansman refers is the taste of the preparation. This is a matter of individual judgement. Our inspector analyst regards it as "not unpleasant." One person who has taken it for some time, informs us that it has an objectionable odour but no taste. Others claim that its taste is not pleasant, but that it has no bad odour. The majority of people, however, find it easier to take than fresh liver.

Dr. Hansman raises the question of the concentration of the alcohol employed in the desiccation. This matter was investigated by our inspector. The concentration was chosen after much experiment. We are not prepared to disclose the percentage concentration, but can assure our readers that it is optimal and that there is no loss of active principle. Dr. Hansman's objection that it is insoluble in warm water and cannot be given in the form of sandwiches or mixed with other food does not require reply. "Karna Vita" is desiccated liver and the dose of the powder is relatively large. One does not give ice cream in boiling water nor does one usually mix bread with other foods.

In regard to the price Dr. Hansman's logic seems to be at fault. Why the bulk of the material should be taken into account in a plain matter of price we cannot understand. Neither does "the relative initial cost in the refining of the two substances," whatever this may mean, make any difference. The fact remains that "an effective daily dose" of "Karna Vita" costs nineteen pence, while that of the imported extract, according to Dr. Hansman, costs thirty-one pence.

A good liver extract could be prepared in Australia, but its price would be as high as the imported extract. The dried liver substance is just as effective, is not difficult to take and is much less expensive.—EDITOR.]

## HERPES ZOSTER AND VARICELLA.

SIR: Dr. Stewart's and Dr. Lawrence's interesting letters concerning the relationship between *herpes zoster* and varicella inspire me to record a case in which there seems little doubt that a varicella infection was derived directly from a case of *herpes zoster*.

About a year ago I was called to treat a case of typical *herpes zoster* occurring in a man in his late forties. Within a few days this man's wife developed varicella. No other cases of varicella had occurred in the district for many months, nor had either patient been away for a considerable time. The male patient showed no signs of varicella, but one seems justified in concluding that he was the source of his wife's infection.

Yours, etc.,

ALFRED JACOBS.

Yarloop,
Western Australia.
July 18, 1929.

## THE GONOCOCCUS AND HEAT.

SIR: In a recent issue of the journal Dr. Maguire referred to the common belief that the gonococcus cannot survive heat. This belief is quite incorrect, as recent workers on the subject have clearly shown that the gonococcus can survive 46·1° C. (115° F.) and more for lengthy periods of time even in culture. Pelouze in his recent edition makes mention of this. If the bacterium can withstand this in culture, it could probably stand more in the urethra or cervix, where conditions are more ideal for its existence. No urethra or cervix could withstand such temperature without suffering trauma. Diathermy acts, when applied carefully, by stimulating tissue repair. A perhaps more successful and certainly more tedious modality is ionization. The ions used are zinc, copper, mercury and some others. Using these ions in the correct concentration and with the right milliampèrage cervical erosions, granulation and ectropion can be caused to disappear rapidly. The discharge clears up in proportion to the success of the treatments in reducing granulation *et cetera*. The technique of application is not extra difficult. Ionization holds a questionable position in treatment of the urethra. The technique would be difficult to do it properly.

Yours, etc.,

JAS. M. O'DONNELL.

141, Macquarie Street, Sydney.
July 20, 1929.

## "PERRY AND MONKHOUSE."

SIR: The late Dr. N. J. Dunlop suggested that the names of the two surgeons who accompanied Captain Cook in the *Discovery* should be commemorated by the Coast Hospital being called "Perry-Monkhouse" Hospital.

The forthcoming Australasian Medical Congress would afford a suitable opportunity for such commemoration, which was endorsed by the members of the Section of Medical History and Literature of the New South Wales Branch of the British Medical Association.

Yours, etc.,

J. S. PURDY.

Sydney.
August 8, 1929.

## THE PREVENTION OF DISEASE.

SIR: In your article in THE MEDICAL JOURNAL OF AUSTRALIA, July 13, you rightly call attention to the importance of the prevention of disease and deplore the fact that, though it is some years since the report of the Royal Commission was issued, the most important recommendations are still in official pigeon holes. You claim to have supported the proposals of the Commission as strongly as possible.

Bearing the above in mind one offers comment on certain paragraphs of the article.

A case is made out for handing over the duty of prevention of disease to the Commonwealth as against cooperation and coordination between States and Commonwealth. For obvious reasons the handing over to the Commonwealth is for the future. Academic discussion of this subject will not help us much. It would serve the public interest better to consider methods that will insure that the recommendations of the commissioners be acted upon forthwith.

"The State governments would be acting in the interests of the people of Australia if they relinquish their sovereign rights in connexion with health." Written from the quiet of an editorial chair, this is a mere platitude.

Has the Editor the courage of his convictions sufficiently to address the delinquent States?

In the meantime it would be expedient for the Commonwealth Health Department to induce the States to remodel their principles of administration on a model plan.

According to the leading article no such action has been taken and THE MEDICAL JOURNAL OF AUSTRALIA and the Commonwealth Health Department could immediately act in concert to cause the good work to go on.

The article stated that the Commonwealth Government has manifested its willingness to carry into effect the recommendations of the Commission. Would the Editor kindly quote his authority for this statement?

The Royal Commissioners and the Editor urge that the general practitioner should be enlisted in a strenuous attempt to conquer preventible disease. But how and when and where?

Neither the general practitioner nor his representatives, the councils of the various branches of the British Medical Association, has a place on the Federal Health Council. Has the Editor of THE MEDICAL JOURNAL OF AUSTRALIA ever raised his voice in protest thereat?

One can imagine no more difficult problem than fitting the general practitioner into a universal scheme of preventive medicine.

At the conference of practitioners to be held in Sydney in September some of the difficulties to be encountered will come up for discussion. Some have already been indicated in a memorandum published by the Council of the Queensland Branch in THE MEDICAL JOURNAL OF AUSTRALIA.

In this connexion perhaps the Editor will spare a little time and space to assist the committee that has undertaken the duty of preparing an agenda for the meeting.

One understands from the press that quite recently at a conference of State and Federal Premiers various matters affecting the public health were discussed. Once again neither the general practitioner nor his representative was present nor consulted. Is it any wonder if the general practitioner looks on the whole matter as a political gesture?

We cannot concede, Mr. Editor, that you have supported the various proposals as strongly as possible, but, being optimistic, we hope for the best.

Yours, etc.,

E. S. MEYERS.

Ballow Chambers,
Wickham Terrace, Brisbane.
July 15, 1929.

[Dr. Meyers asks whether the Editor has the courage of his convictions sufficiently to address the delinquent States. THE MEDICAL JOURNAL OF AUSTRALIA has urged all the States, for all are delinquent, to relinquish their sovereign rights in regard to health legislation, not once or twice, but repeatedly. The commissioners recognized that it would be better for the States to approach the Commonwealth than for the latter to "obtain general powers to legislate on health." In the Hone-Newland report the principle was established that failing the desirable control of health administration by the Commonwealth, the States should hand over to the Commonwealth those parts of their rights and powers to enable the Federal Department of Health to act in conjunction with the States in a manner similar to that obtaining in regard to the United States Public Health Service. The Federal Committee and the several Branches have endorsed the principle of coordination of effort by the Commonwealth and the six States. On several occasions the suggestion that power should be given to legislate by the Commonwealth has been endorsed as advisable, but has been tentatively replaced by a scheme of cooperation, because of the constitutional difficulty. Our contention is that since the offer of cooperation and coordination of effort have not resulted in the introduction of uniform legislation or an improvement in the administration of the existing health enactments, the time has now arrived when steps should be taken to transfer the powers from the States to the Commonwealth.

Dr. Meyers further asks us to produce evidence of the willingness of the Commonwealth Government to carry into effect the recommendations of the Royal Commission. The evidence is to be sought in the actions taken by the Commonwealth Department of Health since the report was issued in regard to nearly every recommendation to which effect can be given by the Commonwealth Government alone. The recommendations to Part I have been carried into effect. Steps have been taken to bring the proposals embodied in the recommendations to Part II to the notice of the Defence Department, but action has not been taken because of the advice of the authorities of the Navy, Army and Air Force. The Federal Health Council has come into existence. The Commonwealth is now completing the building of the School of Hygiene and Tropical Medicine in the grounds of the University of Sydney. Action has been taken in regard to maternal mortality and morbidity and infant welfare, more or less on the lines laid down in the report. Several other recommendations have been adopted.

Dr. Meyers couples the name of the Commonwealth Health Department and that of the Royal Commission with the Editor. It should be pointed out that the Branches of the British Medical Association in Australia through the Federal Committee have endorsed the Hone-Newland report and the report of the Royal Commission and in consequence the policy expressed and implied in those two reports has become the policy of the medical profession in the Commonwealth. THE MEDICAL JOURNAL OF AUSTRALIA is therefore voicing the opinion of the medical profession in advocating the adoption of the proposals contained in these reports. The enlistment of the whole medical profession in an effort to combat preventible disease should be carried out on the lines of the scheme outlined in the Hone-Newland report at once throughout Australia. It has not been suggested by the Councils of the several Branches of the British Medical Association in Australia or by the Federal Committee that the Branch Councils should be represented on the Federal Health Council. This body is in effect a sort of departmental committee and its constitution has the approval of all the Branches. It would serve no useful purpose if the general practitioner were represented on the Federal Health Council.

Dr. Meyers asks for representation of the medical profession at a conference of the Commonwealth Government and the State Premiers. It is somewhat difficult to take him seriously in this connexion. He refers to a conference of medical practitioners that will be held in Sydney in September to discuss many matters that have already received the attention of the Federal Committee. If those attending the conference can evolve a better practical policy than has yet been devised, this policy will no doubt receive the careful consideration of the Federal Committee when a report is submitted to the committee by one of the Branches.—EDITOR.]

## THE CANCER PROBLEM.

SIR: Your footnote to my letter published in the journal of July 20 is not an explanation of the statement to which I took exception. No one ever questioned the harm done by unfounded announcements. Blair Bell and others had just as sound a working hypothesis on which they based their different experimental treatments as had Pasteur. The administration of mercurial salts in the treatment of syphilis was pure empiricism, as also was the administration of quinine in malaria two hundred years before the causative organism was discovered.

As for pathologists groping in the dark, that is a matter for pathologists to reply to, but I would refer you to a recent article on the ætiology of cancer by Ewing, one of the greatest living pathologists.

Yours, etc.,

D. KELLY.

185, Macquarie Street,
Sydney.
July 26, 1929.

# Proceedings of the Australian Medical Boards.

## VICTORIA.

THE undermentioned have been registered under the provisions of Part I of the *Medical Act*, 1915, of Victoria as duly qualified medical practitioners:

O'Brien, Augustine Byrne, L.R.C.P. *et* S. (Edinburgh), 1929, L.R.F.P.S. (Glasgow), 1929, Kerang.

Nairn, Bertram William, M.B., B.S., 1926 (Univ. Melbourne), Perth Hospital, Western Australia.

## Obituary.

### EDWARD CHAMPION.

WE regret to announce the death of Dr. Edward Champion which occurred at Ballarat, Victoria, on August 24, 1929.

## Books Received.

OTOSCLEROSIS: A RESUMÉ OF THE LITERATURE TO JULY, 1928, Compiled under the direction of the Committee on Otosclerosis, American Otological Society; A. B. Duel, M.D., Editor; Volumes I and II; 1929. New York: Paul B. Hoeber, Incorporated. Royal 8vo., pp. 730. Price: $15.00 net.

THE CONQUEST OF CANCER BY RADIUM AND OTHER METHODS, by Daniel Thomas Quigley, M.D., F.A.C.S.; 1929. Philadelphia: F. A. Davies Company. Royal 8vo., pp. 560, with illustrations. Price: $6.00 net.

SLEEP AND THE TREATMENT OF ITS DISORDERS, by R. D. Gillespie, M.D., M.R.C.P., D.P.M.; 1929. London: Baillière, Tindall and Cox. Crown 8vo., pp. 276. Price: 7s. 6d. net.

## Diary for the Month.

SEPT. 7.—Australasian Medical Congress (B.M.A.).
SEPT. 10.—Tasmanian Branch, B.M.A.: Branch.
SEPT. 10.—New South Wales Branch, B.M.A.: Ethics Committee.
SEPT. 11.—Central Northern Medical Association, New South Wales.
SEPT. 11.—New South Wales Branch, B.M.A.: Nomination of Candidates for Federal Committee.
SEPT. 12.—Victorian Branch, B.M.A.: Council.
SEPT. 13.—Queensland Branch, B.M.A.: Council.
SEPT. 17.—Tasmanian Branch, B.M.A.: Council.
SEPT. 17.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
SEPT. 17.—New South Wales Branch, B.M.A.: Organization and Science Committee.
SEPT. 18.—Western Australian Branch, B.M.A.: Branch.
SEPT. 18.—South Sydney Medical Association, New South Wales.
SEPT. 24.—New South Wales Branch, B.M.A.: Medical Politics Committee.

## Medical Appointments.

Dr. Albert Elijah Gribble and Dr. Harvey Herbert Hurst have been appointed Resident Medical Officers for interchange between the Adelaide Hospital and the "Mareeba" Babies' Hospital, South Australia.

* * *

Dr. Augustus Leo Kenny (B.M.A.) has been appointed a Member of the Medical Board of Victoria.

* * *

Dr. Philip Santo Messent (B.M.A.) has been appointed a Member of the Dental Board of South Australia.

* * *

Dr. Francis Grene Power (B.M.A.) has been appointed Government Representative on the Bowen Fire Brigade Board, Bowen, Queensland.

* * *

Dr. Christopher Norman Matheson (B.M.A.) has been appointed a Trustee of the Girls' Grammar School at Rockhampton, Queensland.

* * *

Dr. Leslie Thomas Jobbins (B.M.A.) has been appointed Government Medical Officer at Pomona, Queensland.

## Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xx.

BURREN JUNCTION MEDICAL COMMITTEE: Medical Officer.

THE WOMEN'S HOSPITAL, SYDNEY: Junior Resident Medical Officer.

## Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

| BRANCH. | APPOINTMENTS. |
|---|---|
| NEW SOUTH WALES: Honorary Secretary, 21, Elizabeth Street, Sydney. | Australian Natives' Association.<br>Ashfield and District United Friendly Societies' Dispensary.<br>Balmain United Friendly Societies' Dispensary.<br>Friendly Society Lodges at Casino.<br>Leichhardt and Petersham United Friendly Societies' Dispensary.<br>Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney.<br>North Sydney Friendly Societies' Dispensary Limited.<br>People's Prudential Assurance Company, Limited.<br>Phœnix Mutual Provident Society. |
| VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne. | All Institutes or Medical Dispensaries.<br>Australian Prudential Association Proprietary, Limited.<br>Mutual National Provident Club.<br>National Provident Association.<br>Hospital or other appointments outside Victoria. |
| QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane. | Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing.<br>Brisbane United Friendly Society Institute.<br>Stannary Hills Hospital.<br>Toowoomba Friendly Societies Medical Institute. |
| SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide. | All Contract Practice Appointments in South Australia.<br>Booleroo Centre Medical Club. |
| WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth. | All Contract Practice Appointments in Western Australia. |
| NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington. | Friendly Society Lodges, Wellington, New Zealand. |

Medical practitioners are requested not to apply for appointments to positions at the Hobart General Hospital, Tasmania, without first having communicated with the Editor of THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales.

## Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

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